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Change Sweeps East Europe

Its impact on chemistry and the chemical industry

News of the Week

■ New initiatives by AAAS, NSF take comprehensive approach to reforming science education. Page 4

■ U.S. has offered to stop making binary chemical arms if the Soviets agree to a timetable for destroying their chemical arsenal. Page 5

■ Recent raid of White Chemical by New Jersey's criminal justice division turned up a slew of improperly stored drums containing chemicals; no charges have been filed yet. Page 6

■ Soon-to-be-released final part of EPA's proposed rules banning land disposal of hazardous wastes already is receiving criticism. Page 6

■ Misconduct in science again is getting Congress' attention, with a draft bill circulating that would make it easier to pursue alleged wrongdoings, and with another round of hearings in the offing. Page 7

■ Planned Occidental-Soviet joint PVC plant in the Ukraine has been delayed because of local residents' pollution concerns. Page 7

Cover: AP/Wide World photo

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Change Sweeps East Europe

Political upheaval has turned East Europe upside down in the past year. This special issue of C&EN explores the impact recent dramatic events there have already had and will have in the future on the chemical industry and chemistry itself.

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The chemical industry

With a population of more than 100 million, East Europe presents a promising market for chemicals. All six of the nations there have well-established chemical industries of their own. But their plants largely are dirty, technically obsolete, and economically inefficient. Bringing them up to western standards will require massive new investments. But until the political climate becomes more stabilized, chemical firms in the West probably will tread with caution.

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Chemical science

Chemistry did not wither under East Europe's former communist regimes. But the climate of isolation and inadequate funding imposed by centralized control and rigid political dogma was far from propitious, either for chemical research or chemical education. Now, with their newly won freedom, scientists in the East are restructuring their operations and organizations. Help from the West would be invaluable, although, at least in the U.S., no clearcut policy for providing assistance has yet emerged.

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Chemical & Engineering News

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LETTERS

Thermite reaction

SIR: Because the thermite reaction is so widely used as a lecture demonstration, I want to report on an incident that occurred during a "Chemical Magic Show" on March 2. The incident (C&EN, March 12, page 23) involved a traditional thermite reaction carried out in a clay pot with a hole in the bottom for the molten iron to drip into a container of water with sand in the bottom.

Although some uncertainty remains about what happened, we believe that the reaction vessel failed as the reaction reached its maximum intensity, dropping the entire contents into the water. This apparently led to entrapment of water in the molten metal [see Flory, Paoli, Mesler, *Chem. Eng. Prog.*, **65**, 50 (1969)], which resulted in a physical vapor explosion that propelled some of the hot iron into the audience. Although the first two rows of the lecture hall were empty for safety reasons, several members of the audience received minor burns. Fortunately, there were no serious injuries.

In view of this incident (and another similar one reported to me that occurred several years ago in which wet sand was used to collect the hot iron), I would recommend that dry sand be used to receive the hot iron from the thermite reaction. Water should not be present in the container used to receive the iron.

Steven S. Zumdahl

Professor of Chemistry

Director, General Chemistry

University of Illinois, Urbana-Champaign

SIR: With regard to the thermite demonstration-explosion at the University of Illinois, I can recall a related incident that occurred in our laboratory some years ago.

A quantity of silver metal, reclaimed from photographic waste solutions, was melted in a muffle furnace, and most of it poured into a firebrick mold. About 13 g remained, which I intended to convert to mossy silver by pouring into a small beaker full of water. When the molten silver came in contact with the water, the result was a loud explosion, a fragmented beaker, and about 12 g of silver shot. Fortunately, there were no injuries.

In looking back, I do not regard the incident as an experiment that went wrong, but rather the logical result of an error in judgment. I did not adequately take into account the explosive rate at which water would be converted to steam at the temperature of molten sil-

ver (>962 °C). Thermite-generated molten iron at a temperature well above 1535 °C would result in an even more rapid conversion of water to steam.

Wilson B. Lutz
Manchester College

SIR: A comment on your Science/Technology concentrates about the thermite demo gone bad. In much the same way, I learned of the ability of the thermite reaction, or rather the molten iron product, to explode in water.

In 1961, I was a photographer for the military documenting the testing of Army materiel under cold conditions in Greenland. A thermite grenade, set on a 3/4-inch piece of iron plate on the snow, was being photographed with a movie camera at fairly close range. As soon as the plate melted through into the snow, an explosion occurred. Fortunately, it was not large and no injuries resulted. Water apparently will thermally decompose and recombine explosively!

A. K. Carpenter
Lower Columbia College

Soot formation

SIR: In regard to the article, "Ideas on Soot Formation Spark Controversy" (C&EN, Feb. 5, page 30), we would like to state that neither one of us has passed judgment, on or off record, on the quality and the results of research in cold fusion, nor did we liken work in cold fusion to work in carbon clusters.

Neither did we classify or refer to the work of Richard Smalley and Harry Kroto on carbon clusters or the work in cold fusion as "pathological science," either in the everyday meaning of the word pathological or in the specific meaning described by Langmuir [Langmuir, *Physics Today*, **42**, (10), 36 (1989)].

Lawrence B. Ebert

Exxon Corporate Research Laboratory
Annandale, N.J.

Michael Frenklach

Fuel Science Program, Department of
Materials Science and Engineering
Pennsylvania State University

Editor's Note: Baum's characterization of the tone of the dispute over soot formation is based on, and inferred from, interviews and correspondence with the parties involved. In letters to C&EN, Ebert and Frenklach both state that issues raised by C&EN editorials that were highly critical of the premature and excessive promotion of cold fusion were relevant to earlier C&EN coverage of

Continued on page 68

Chemical Industry

113 million consumers make East Europe a tempting market and its chemical industry needs rebuilding, but investment there could be risky

Patricia L. Layman, C&EN
London, and Earl V. Anderson,
C&EN Northeast News Bureau

"If Europe were once united in the sharing of its common inheritance, there would be no limit to the happiness, to the prosperity and glory which its three or four hundred million people would enjoy." So said Winston Churchill, accepting an honorary degree from the University of Zürich in 1946, half a year after he coined the phrase "Iron Curtain" in an address at Westminster College, Fulton, Mo.

It is a shame, then, that the British statesman could not have been on the scene in Berlin on Nov. 9 last year, when that Iron Curtain was irrevocably shattered.

It wasn't Joshua fighting the battle, and it wasn't a trumpet that blew down the Iron Curtain. Rather, it was the moral pressure of hundreds of thousands of citizens. But the walls came tumbling down, nevertheless. What occurred in Berlin last November was only perhaps the most vivid event in the wave of human demand for freedom. The grand practical text of Marx's theories, in the U.S.S.R. since 1917 and the rest of East Europe since the end of World War II, came to an end with breathtaking quickness.

And just as the symbolic tumbling of the Berlin wall—which less than a year before had seemed secure for the foreseeable future—has opened

opportunities for human and economic development in the East European countries, so has it also opened opportunities for the development of the East European chemical industry. Such development will come from internal efforts, but even more important, from partnerships with industry in both the West—West Europe and North America—and the Far East.

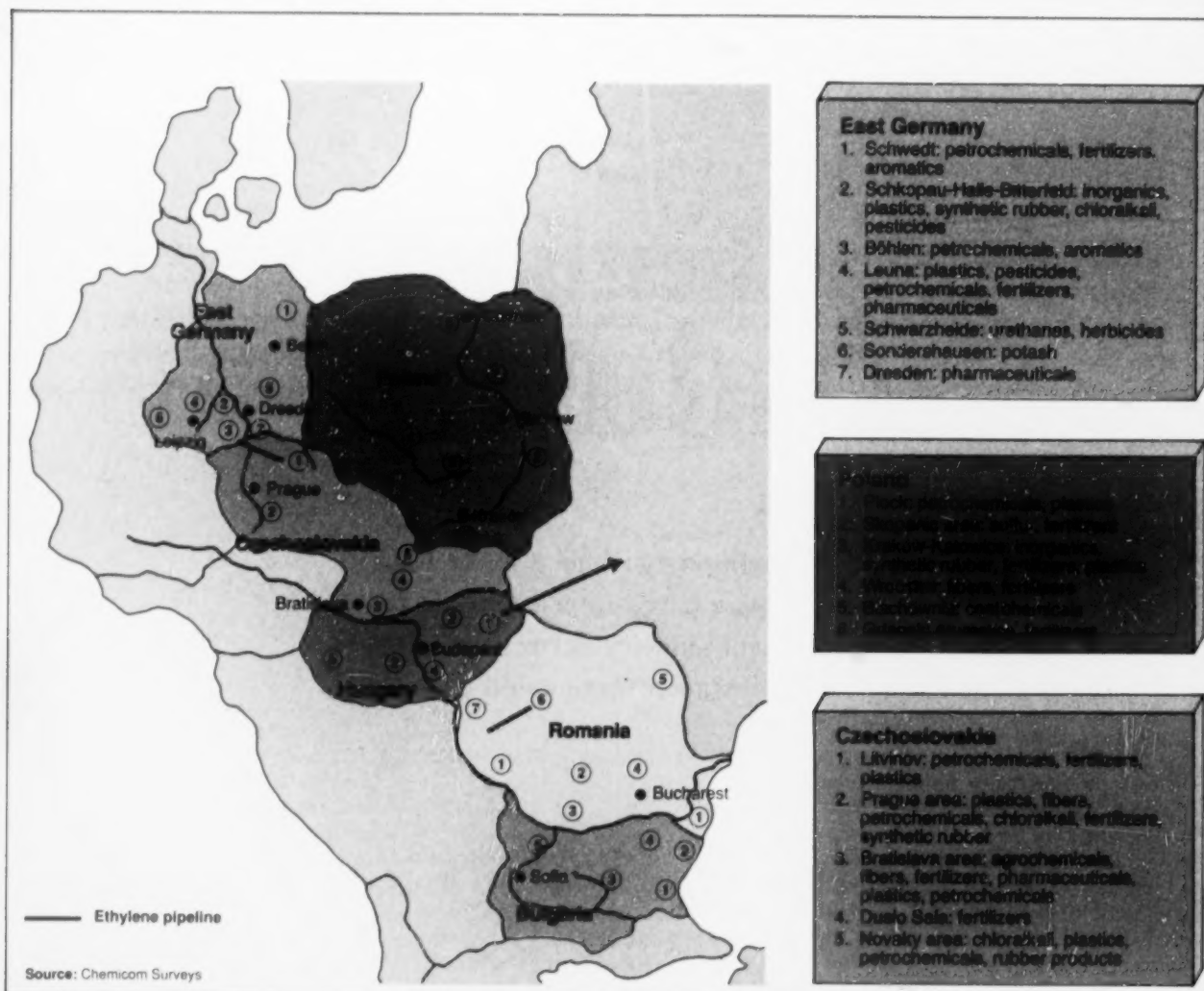
The very fact that people in both East and West Europe are talking about development of the chemical industry—or perhaps, more precisely, its redevelopment—shows enormous optimism. For there are major problems attendant to any development in East Europe—and not just of the chemical industry. It is easy to tick off some of the problems:

- Lack of money, especially hard currency.
- Small populations, which will be even smaller if ethnic pressures break up some of the nations.
- Old plants and outdated technology, which inefficiently produce goods of unsatisfactory quality.
- State-owned, unproductive industries, usually wildly overstaffed.
- Severe environmental problems.

- Dependence on imported raw materials, in most of the countries.

These problems raise a number of questions—far more than, as yet, there are answers. For example, how will East European industries cope with the lack of foreign currency, which used to be provided by the central governments or appropriate ministries? How will they tap into development funds being set up by various banks and governmental agencies? How will they coexist with their counterpart industries, particularly in the European Community (EC), which—while aware, concerned, and interested in what is happening in East Europe—is marching toward its own single market by the end of 1992?

In addition to the general economic problems and questions hanging over the economies of East Europe, the chemical industries there also have their own special problems. At stake are industries that are sometimes even more significant to their countries, in terms of their contributions to gross national products and exports, than the chemical industries in West Europe or North America. Chemistry and the chemical industries in East Europe, indeed, have an honorable history, being the birthplace of a variety of technologies, ranging from the original Haber-Bosch ammonia process, in what is now East Germany, to poly(methyl methacrylate),



developed for soft contact lenses in Czechoslovakia.

For the chemical industries in East Europe, other questions pose themselves. For example, how will they cope with environmental pollution problems of massive proportions? How will their structures have to change, to adapt to changing conditions and requirements that are being placed on the industry? How will they cope with privatization? How will they cope with the disintegration of the Soviet-bloc Comecon trading structure? And how will the kinds of products now being produced in East Europe have to change, in terms of quantities and plant locations.

That changes will occur there is no doubt. However, factors such as the direction of those changes and their pace and magnitude are unknowns. That such changes will have significant impact on the world's economy is also not disput-

ed. For example, American Express Bank, in the latest issue of its *AMEX Bank Review*, suggests that economic reform in East Europe could eventually add 10% to world trade. However, the pace of change will be limited by the speed of price reform and the creation of a satisfactory structure for foreign investment, the review adds.

In the very long term, the review says, trade from East European countries will come into line with average per capita trade in the EC. For the next five years, however, with reforms, the region could achieve a 10 to 20% per year rate of growth in exports, adding 1 to 2.5% to existing world trade, or between \$31 billion and \$76 billion.

If for no other reason than proximity, West Europe will be on the front line of the efforts to help redevelop the industries and economies of East Europe. West Europe, under the aegis of the EC, for exam-

ple, has been entrusted with the administration of the PHARE program—Poland/Hungary Assistance in Restructuring Economies. That program, established last summer, has since been extended to include East Germany, Bulgaria, Czechoslovakia, Romania, and Yugoslavia.

The geographic nearness of the East European countries also has, over the centuries, built a legacy of cultural and commercial ties that bind, that not even a postwar-split has changed. For example, West Germany is busy now working out details of reunification with East Germany, with its chemical industry one of the major industrial sectors involved in counterpart discussions. And Austrian industrialists are finding success in Hungary.

Meanwhile, the East European members of the Council for Mutual Economic Assistance (CMEA) are working to rebuild bridges back to the rest of Europe, even as the EC it-

Hungary

1. Leninvaros: plastics, fertilizers, petrochemicals
2. Százhalombatta: aromatics
3. Kazincbarcika: plastics, fertilizers, organic chemicals, chloralkali
4. Budapest: fertilizers, plastics, pharmaceuticals, pesticides
5. Lake Balaton area: organic chemicals, fertilizers, aromatics

Romania

1. Midia-Năvodari: aromatics, ethylene, propylene, plastics, fertilizers
2. Pîtzst: petrochemicals, plastics, carbon black, herbicides, chloralkali, inorganics
3. Craiova: acetylene-based organics, fertilizers
4. Ploiesti: petrochemicals, synthetic rubber, fertilizers
5. Borzesti: petrochemicals, synthetic rubber, chloralkali, fibers, fertilizers, pesticides
6. Timisoara: petrochemicals, pharmaceuticals
7. Arad: fertilizers

Bulgaria

1. Burgas: petrochemicals, fibers, synthetic rubber, plastics
2. Devnia: chloralkali, polyvinyl chloride, fertilizers
3. Kazanlak: essential oils
4. Riazgrad: pharmaceuticals
5. Vratza: fertilizers

self is accelerating its pace toward the economic, monetary, and political union implicit in the single market of 1992.

The EC pace has become so rapid—and irrevocable enough—that non-EC countries in the West are contemplating applying to join. Even as the EC is negotiating extensive trade agreements with the nations of the European Free Trade Assn., for example, EFTA members are giving serious thought to joining the EC. Austria already has applied to join the EC, and political observers expect Norway to do so this year.

Hence, in a way, it comes as no surprise that the East European countries find the possibility of EC membership intriguing. At least one political observer has predicted Hungary will be a member of the EC by the end of this decade and that other CMEA countries will have at least applied for membership.

Such membership would offer the promise of what western countries consider normal trading patterns, normal financial relations, normal supply-demand markets. And one of the major beneficiaries will be the chemical industry—albeit after many changes to the industry in East Europe. What the industry is suffering from now stems from such factors as the legacy of four and a half decades of five-year planning, of dependence on the natural gas and oil resources of the Soviet Union, and, particularly in East Germany, dependence upon coal as a chemical feedstock.

East Germany: East Europe's top chemical producer

East Germany has the largest chemical industry in East Europe, except for that of the Soviet Union. Most of its industry is organized into combines, points out a study on the East bloc by London-based Chemicon Surveys, whose directors, Tony Cox and Natasha Alperowicz, have monitored the East European chemical industry for the past 10 years. These combines are amalgamations of industrial firms controlled by a single management, and having their own industry minister. With the move to reunification with West Germany progressing quickly, it is clear that the role of these combines will soon be changing, but for now, they still are the dominant structural force for industry in East Germany.

Chemicon's most recent survey, "On Course to Reform: the East European Chemical Industry 1986-1990," hinted at some of the changes that Cox and Alperowicz think will be taking place throughout the East bloc. It also examines the various combines in the industry. The chemicals and minerals industries account for 16 of the country's 129 combines and employ nearly 350,000 workers. Most of the industry—about 70%—is based on oil, but coal still accounts for about 15% of the chemical industry's feedstock, through carbide-acetylene.

With its 27,500 employees, Petrochemisches Kombinat Schwedt, is the largest and newest combine. It refines 80% of East Germany's crude

oil, and produces about 33% of its chemicals, making more than 400 different products ranging from aromatics and nitrogen fertilizers to pure laboratory chemicals and consumer products, including household aerosols and shoe polish.

Chemiekombinat Bitterfeld employs 30,000 workers in seven factories to make about 4000 products. These include inorganics, dyestuffs and intermediates, chlorine and caustic soda, fluorocarbons, silicones, photochemicals, rubber chemicals, and fabricated plastics goods, as well as about 60% of East Germany's agrochemicals. Bitterfeld has been cited as one of the most highly polluted chemical centers in East Germany.

In the same region, at Schkopau, Chemische Werke Buna also has 30,000 employees, making about 11% of East Germany's chemicals. About 60% is synthetic rubber; the combine also makes calcium carbide, polyvinyl chloride, polyethylene and polyester resins, plastics additives, solvents, and consumer goods.

Sondershausen's Kombinat Kali exploits the country's vast potash deposits, but also makes a variety of other mineral products. Fiber production, both cellulose and non-cellulose, is dominated by Chemiefaserkombinat Schwarza, at Rudolstadt-Schwarza, making nylon, polyester, acrylic, and polyvinyl fibers. Kombinat Agrochemical Piesnitz specializes in nitrogen and phosphate fertilizers and pesticides.

And in Leuna—historical home of the Haber-Bosch ammonia process—the combine Leuna-Werke Walter Ulbricht accounts for about 12% of East Germany's chemical production. Leuna, with its ethylene cracker, is strong in basic petrochemicals, plastics, detergents, and gasoline additives, as well as more downstream products such as pharmaceuticals, rare gases, and electronics chemicals. The country's acetylene chemistry operations are based there and at Schkopau.

Poland: Coal still an important raw material

Unlike East Germany, the chemical industry in Poland has not been organized into combines; much is

still handled by separate enterprises. Chemicon Surveys, for example, estimates that by the end of the 1980s, 75% of investment in the chemical industry was covered by individual enterprises.

In a country dependent upon Soviet imports for 95% of its oil and for all its natural gas, but self-sufficient (indeed, an exporter) in coal, coal chemistry is a strategically important option where the economics are favorable. For example, more than 1 million metric tons of coal tar and benzole are processed annually into aromatic chemicals—accounting for 53% of the country's total toluene production, 40% of benzene production, and 7% of phenol production. Acetylene is still an important raw material for a variety of other chemicals, including synthetic fibers.

One major petrochemical center of Poland is Plock, where operations are based on trouble-plagued ethylene units. Another is at Blachownia, which also produces coal chemicals. Plastics—low-density polyethylene, polypropylene, polyvinyl chloride and polystyrenes—are produced at Plock, Oswiecim, Tarnow, and Wloclawek; other units concentrate on polyesters, epoxies, and fluoropolymers. Synthetic leather, based on the Du Pont Corfam technology, is produced at Pionki, southeast of Warsaw.

Oswiecim, the Polish name for Auschwitz, is the synthetic rubber center of the country, producing styrene-butadiene rubber, polybutadiene emulsions and styrene resins, as well as synthetic rubber and latex.

Poland is one of the world's major producers of sulfur, using both open-cast mines and Frasch technology: The country has about 30% of the world's reserves. The Skopanie area, centered around Tarnobrzeg, is the focus of this industry, where sulfuric acid, a strong Polish industry, also is produced. In addition, this region is a center for production of both nitrogen and phosphate fertilizers. Potash fertilizers are imported from the U.S.S.R. and East Germany.

According to Chemicon, Poland's application rates of agrochemicals are among the lowest in Europe, and lower than in any other CMEA member country. Only about 40% of the pesticides registered for use are produced in Poland, including some made under license; domestic production is mainly of old, first-generation products.

On the other hand, in inorganics, the country does better. Inowroclaw, for example, is a major site for chlor-alkali production, using nonmercury technology. And the country is a leading producer and exporter of organic dyes and pigments; about 80% of the country's production comes

from Zgierz, near Lodz. The Boruta works at Zgierz produces 20 groups of dyes, including direct, to nigrosine, aniline, reactive, stilbene-azo, and food dyes.

Czechoslovakia: Specialty chemicals are important

Compared with most other East European countries, Czechoslovakia gives less emphasis to petrochemicals than it does to other chemical sectors, primarily because of the country's dependence on oil from the U.S.S.R. Instead, the country stresses less energy-intensive, high-value-added specialties, including rubber chemicals, synthetic fibers, and textile auxiliaries.

Because the country is a federation of two republics—the Czech (Moravia and Bohemia) and the Slovak—its industry tends to have many duplicate features. For example, the country's chemical industry is not solely under the aegis of a minister of the chemical industry but also is under the National Ministries for Industries, of which there is one in each of the two republics. And two management organizations—Chemopetrol, in the Czech Republic, and Slovnaft, in Slovakia—handle petrochemicals, based on ethylene crackers at Litvinov and Bratislava.

Litvinov's production includes a variety of petrochemicals and plastics—high-density polyethylene, oxo alcohols, aromatics, and α -olefins.

Slovnaft's production, at Bratislava, includes low-density polyethylene, ethylene oxide and glycols, polypropylene, and dimethyl terephthalate. Its greatest emphasis, however, is on rubber chemicals, including vulcanization accelerators and inhibitors, antioxidants and antiozonants, and plasticizers.

Polyvinyl chloride production is split between Novaky, in Slovakia, and Neratovice, in Bohemia; polystyrene and acrylobutadiene-styrene resins are produced at Kralupy, just

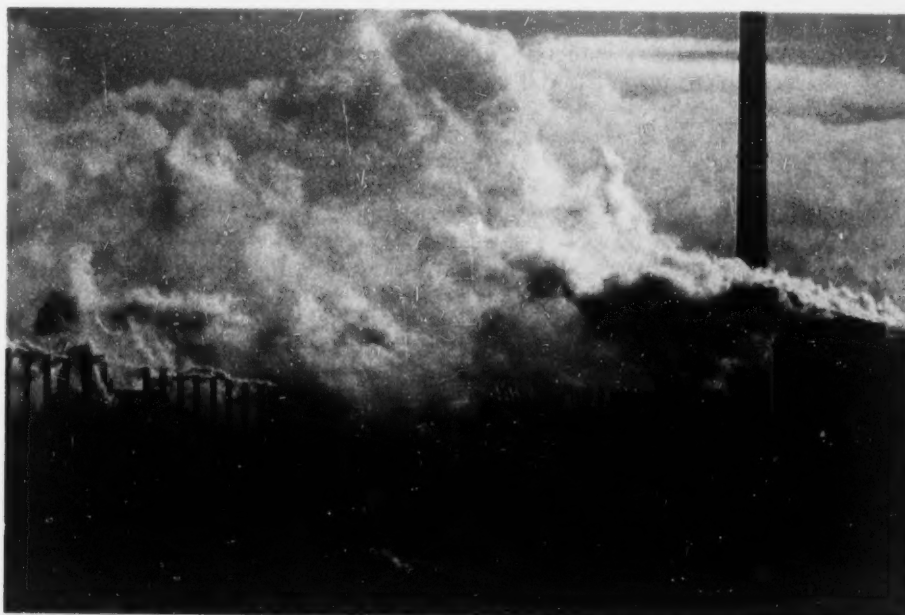


Photo by TIME magazine's Peter Jordan

East Germany's chemical industry is a major contributor to pollution

north of Prague. Poly(methyl methacrylate)—the original soft-contact lens material—is produced at Zilina, in Slovakia.

Synthetic fibers—especially polypropylene fibers and cellulose—are increasingly important to Czechoslovakia, which otherwise must import natural fibers such as wool and cotton. The country is a major producer of polypropylene fibers worldwide, using its own technology. But nylon and polyester fibers are also important, with production tending to be located in Slovakia.

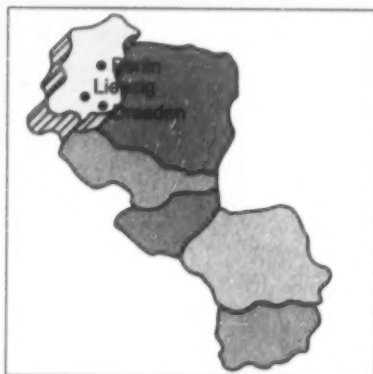
A net importer of inorganic chemicals, Czechoslovakia is heavily dependent on imported raw materials for fertilizers, for example, which it produces at Litvinov, Strazske, and Duslo Sala. Similarly, the country imports soda ash to augment domestic supplies, particularly to support its glass production, an important national industry. Major chloralkali capacity is at Neratovice, using mercury-cell technology.

Raw materials for both pharmaceuticals and agrochemicals must be imported, but the country is nonetheless working to build up its domestic production in these sectors. Agrochemicals are produced primarily at Neratovice and at Slovnaft's facilities at Bratislava and Duslo Sala. Pharmaceuticals are made at a variety of sites around the country, with development supervised by the State Institute for Drugs Inspection and the Commission for New Drugs, part of the Czech and Slovak Ministries of Health.

The country is also devoting increased attention to biotechnology, with its research institutes working on genetic engineering, microbiology, and environmental protection.

Hungary: Pharmaceuticals are key products

The chemical industry of Hungary is currently one of many industrial groups under the Ministry of Industry. Hungary was the first CMEA country to allow western joint ventures, and since 1982, it has permitted foreign partners to own majority shares in Hungarian enterprises. The chemical industry employs between 110,000 and 120,000, in 86 enterprises and 356 industrial plants,



East Germany in brief

Size: 41,768 square miles
Population (1989): 16.6 million
GNP (1988): \$207.2 billion
GNP per capita (1988): \$12,500
World trade:
Imports (1988): \$29.6 billion
Exports (1988): \$30.7 billion
Telephones per 100 people (1985): 22
Automobiles registered per 1000 people (1986): 209

and is the nation's second largest industrial sector after mechanical engineering, according to the definitions the country's statisticians use.

About 40% of output is in oil refining, followed by pharmaceuticals, at 13%. Gas production and distribution, and fertilizers and other agrochemicals each account for 11% of production; plastics, fibers, rubber chemicals, cosmetics and toiletries, and miscellaneous specialties make up the remainder.

The country's aromatic chemicals industry is centered around a refinery at Szazhalombatta, producing benzene, toluene, xylenes, and maleic anhydride. Petrochemicals are based at the Tiszai Vegyi Kombinat (TVK) unit at Leninvaros. The olefins plant there produces ethylene, propylene, C₄ and C₅ fractions, and gasoline-blending components. Leninvaros is at one end of an ethylene pipeline from Kalush, in the Soviet Union, which supplies ethylene in exchange for fiber-grade polypropylene.

The most industrialized of the East European nations, East Germany was established in 1949 from the part of the ruins of Nazi Germany that was controlled by the Soviet Union. It consists of a sprawling northern lowland and a smaller but rugged southern highland.

The most important of the relatively sparse mineral resources are lignite, potash, and rock salt. Major industries include steel, chemicals, electrical products, textiles, and machinery. Main crops are grain, potatoes, and sugar beets, but the country has a food deficit. Important imports include fuels, foodstuffs, and machinery. Steel, chemicals, machinery, and motor vehicles are significant exports.

Until the fall of the Honecker regime late last year, East Germany's economy and political life were rigidly controlled by the central government, which firmly resisted reform; economic growth had been relatively slow. Now, the increasing likelihood of early reunification with West Germany sets East Germany distinctly apart from other East European nations.

Part of the ethylene goes into linear low-density polyethylene. Hungary is surpassed only by Czechoslovakia in plastics consumption per capita, and the plastics industry is important to Hungary. It produces a wide range of plastics and resins, including polyvinyl chloride, polyolefins, amino and alkyd resins, epoxies, maleic resins, and silicones. Kazincbarcika, site of the Borsod chemical combine BVK, is a major polymers site; polymers are also produced at Leninvaros.

In fibers, Hungary specializes in acrylics, followed by cellulose, polypropylene, and nylon fibers. Production is based at the Magyar Viscosagyar complex at Nyergesujfalu, on the Danube River northwest of Budapest. But synthetic fibers are not a major industry.

By contrast, fertilizers are of great significance to Hungary, which has six major complexes throughout the country. Nitrogen fertilizers are produced at Varpalota, Kazincbarcika, and Leninvaros; phosphate and ni-

trogen-phosphate-potassium fertilizers at Peremarton, Szolnok, and Budapest. For other agrochemicals, however, the country has only limited production; its industry relies heavily on formulation and cooperation agreements with western firms, Chemicon Surveys points out.

It is in pharmaceuticals that the Hungarian industry has sparkled. It accounts for about 5% of world trade in pharmaceuticals, with about 60% of its production bound for the export market. Pharmaceuticals represent more than 13% of the industry's production value, and account for nearly 5% of the nation's total exports. Exports consist primarily of active ingredients for older, commodity-type and generic drugs; production is handled primarily by the country's six major pharmaceutical producers, mostly based in Budapest.

Bulgaria: Fertilizer chemicals have a major role

The chemical industry in Bulgaria is overseen by an association of the biotechnology and chemical industries, made up of member enterprises in the biotechnical, chemical, medical, food, and engineering sectors.

There are two main petrochemical centers in Bulgaria, at Burgas and Pleven, near the border with Romania. Burgas, which is by far the larger, uses feedstock oil from the U.S.S.R.; with an integrated downstream petrochemical capacity, it accounts for slightly more than a third of the country's total chemical production. Included are olefins, aromatics, ethylene derivatives, ethanol, alkylates, and paraffins. The complex also produces plastics, synthetic fibers, and synthetic rubber. Production of polyethylenes, polystyrene, and polypropylene is based there.

A plant at Devnia, further north along the Black Sea coast, is the center of Bulgaria's chloralkali production and also makes polyvinyl chloride and plastisols. And a plant at Verila, southeast of Sofia, produces polyols, for urethane production at Ruse, along the Danube to the north.

Burgas also produces acrylic and

polypropylene fibers. Other fiber facilities include Yambol, in eastern Bulgaria, which produces polyester staple and filament; Vidin, in the far northwest corner of the country, which makes nylon; and Svishtov, along the Danube, which manufactures viscose.

Much of Bulgarian industry is devoted to food and agricultural products, so that fertilizers are particularly important. The country has four main fertilizer complexes: Dimitrograd (the largest), Stara Zagora, and Vratza, all in central Bulgaria, and Devnia. Plovdiv is the leading agrochemicals site, with smaller pesticide plants around Sofia.

Pharmaceuticals are also a specialty for Bulgaria, which exports nearly 80% of its production, primarily to other CMEA countries. The country claims to be the world's leading exporter of antibiotics—an indication of the importance the nation places on biotechnology, which perhaps is more important to Bulgaria than to any of the other CMEA countries. From a start in 1961, Bulgaria now specializes in antibiotics, amino acids, enzymes, and plant-protection compounds for human and animal health applications, the food industry, and other industrial applications.

Bulgaria also has a highly prized business in one of the more exotic specialties—rose oil. This essential oil, from the rose fields around Kazanlak, is considered by perfumers

to be one of the best ingredients for fine fragrances and carries a price tag that can run to thousands of dollars per kilogram.

Romania: Chemical industry oriented toward oil feedstocks

In Romania, the chemical industry has been governed by the Minister for Chemical and Petrochemical Industry, who, in turn, reports to the Council for Ministers. It consists of 85 enterprises, with 220,000 employees, and represents probably about 10% of the country's total industrial output.

Romania is the only country in East Europe, other than the Soviet Union, with indigenous oil and gas reserves, which have been worked since before World War I. These fields have to a large extent been depleted, and the country tops off its supplies with imports from the U.S.S.R. and the Middle East; however, it still is an exceedingly heavy energy user. Oil processing and petrochemicals account for 55% of Romanian chemicals production, with about 15% of the country's oil consumption used in the petrochemicals industry, Chemicon Surveys estimates.

The country's largest petrochemicals complex is at Pitesti, with ethylene, propylene, butadiene, and aromatics capacity. Downstream units make acrylonitrile, ethylbenzene, ethylene derivatives, and mercap-



Gdansk is a major fertilizer producing site in Poland

tans, and other products. Pitesti also produces low- and high-density polyethylenes, polystyrene, latices, and carbon black.

Petrochemical complexes at Midia, Borzesti, and Timisoara also produce a wide variety of olefins, polymers, and petrochemicals. For example, Midia produces high-density polyethylene, polypropylene, propylene oxide and styrene. Timisoara supplies polypropylene, phthalates, caustic soda, oxoalcohols, polyether polyols, and even has a fermentation unit for ethanol. The Borzesti complex has one of the widest product ranges, producing about 260 different chemicals, from acetylene to chlorinated paraffins to styrene butadiene rubber.

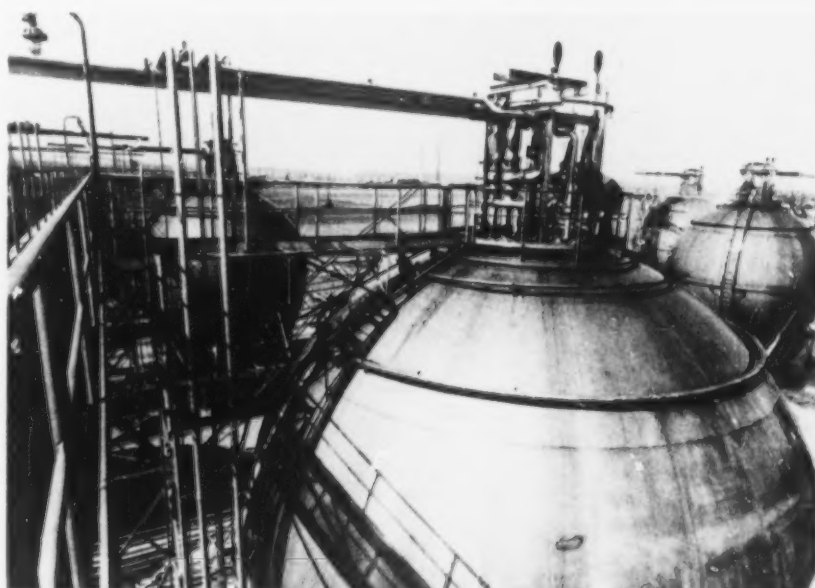
Organic chemicals are the specialty of Craiova, which uses acetylene derived from natural gas cracking; products include methanol and acetic acid and its derivatives.

Romania is East Europe's third largest producer of synthetic fibers, after the U.S.S.R. and East Germany. It specializes in cellulose, but also makes polyester, nylon, and acrylic fibers. The country is also a major exporter of fertilizers, capitalizing on its natural gas reserves. For example, it is the leading East European supplier of urea to the world market, after the Soviet Union. Production of fertilizer is coordinated at Craiova, with major plants for nitrophosphate fertilizers at Arad, Craiova, Tirgu-Mures, and Tirgu-Măgurele.

Major chloralkali capacity is at Gova and Rimnicu Vilcea, both near Pitesti, and at Borzesti.

CMEA agreements split up chemical output

Throughout the past decade, the CMEA countries have, through a complex series of bilateral agreements and understandings, divided the chemical world according to specialized strengths. For example, Romania was the major CMEA source for polyisoprene rubber, chlorine derivatives, and soda ash. Czechoslovakia focused on rubber and textile specialties, dyes, and polypropylene fibers. Poland exported paints and coatings, detergents, organic dyes, and pharmaceuticals. For



Czechoslovakia's only styrene/butadiene rubber plant is at Kralupy, near Prague

Hungary, the areas of specialization included medicines, agrochemicals, plastics, and rubber goods. From East Germany, it was photochemicals, dyestuffs, and herbicides. And Bulgaria specialized in selected agrochemicals, dyes, varnishes, chemical reagents, catalysts, and plastics. Energy-intensive products were, under this basic integration plan, to be produced by the Soviet Union, which, of course, had the basic feedstocks at hand.

Over the past five months, however, the situation has broken down. Always more honored in the breach than the observance, the agreements have suffered as the whole concept of the CMEA itself foundered. In fact, last month, Prague announced that Czechoslovakia was pulling out of three multilateral CMEA agreements. The U.S.S.R., which has built its own production plans based on the CMEA trade agreements, already is concerned that East Germany, for one, will not continue to supply it with imports as promised.

To some extent, the problem is one of the Soviet Union's own making. One of the major topics of discussion at the 5th Annual Conference on Soviet and East European Business Prospects, held last month in London, by PlanEcon Inc., of Washington, D.C., and DRI/McGraw-Hill, was the decision of the Soviets to begin charging world

market prices for the oil and gas it provides its former satellites.

With the end of the subsidies that the U.S.S.R. had been giving and its insistence that its invoices be paid in hard currency, the East European countries will be forced to concentrate on gaining that currency in whatever way possible—even if it means selling to the West, rather than back to the U.S.S.R. "Prices that had very little to do with world pricing are about to change," pointed out PlanEcon president Jan Vanous, "and the impact will be profound."

As things stand now, most chemical industry executives would probably agree with Ray R. Knowland, a managing director of British Petroleum and chairman of BP chemicals: "We are looking with considerable interest but no strategy per se. I'm sure there will be opportunities. However, I doubt many western countries will rush in to the East bloc, without trading partners of some sort. It is not too soon to have an interest, but too soon to have a strategy."

As Günter Metz, president of the European Chemical Industry Federation (CEFIC) puts it, "Just a few months ago, who would have thought that on Christmas Day people from East and West would be able to go through the Brandenburg Gate so easily, or that Vaclav Havel,

Biggest volume of East Europe's chemical output is in inorganic chemicals

Production, thousands of metric tons	Bulgaria	Czechoslovakia	East Germany	Hungary	Poland	Romania
Sulfuric acid						
1980	852	1285	958	590	3019	1756
1985	810	1297	882	520	2863	1835
1988	780	1249	799	512	3166	1650 ^a
Hydrochloric acid						
1980	50	225	106	78	na	289
1985	74	236	137	121	na	447
1988	73 ^b	247	132	113 ^c	na	445 ^a
Nitrogen fertilizer (100% active)						
1980	730	618	943	649	1290	1707
1985	838	526	1078	684	1254	2197
1988	948	596	1382	556	1622	2315 ^b
Benzene						
1980	na	184	na	104	240	na
1985	na	291	na	120	232	na
1988	na	358	na	116 ^c	238 ^b	na
Ethylene						
1980	150	323	na	275	185	na
1985	242	592	na	270	261	na
1988	na	683	na	264	276 ^b	na
Polyethylene						
1980	93	216	119	53	111	124
1985	105	259	187	56	142	163
1988	107 ^c	267 ^b	203 ^c	221	145 ^c	150 ^c
Polystyrene						
1980	16	61	53	na	34	32
1985	25	86	51	na	23	34
1988	25 ^c	74	46 ^c	na	22 ^c	32
Polyvinyl chloride						
1980	64	204	260	173	119	206
1985	98	209	301	170	126	204
1988	22 ^c	219	269 ^c	193	189	208 ^c
Thermoset resins						
1980	16	91	180	51	135	180
1985	406	92	233	49	145	na
1988	322 ^c	94	251 ^c	40	160	na
Synthetic fibers^d						
1980	55	112	139	21	168	141
1985	61	139	158	24	165	185
1988	60 ^c	146	178	33	168	184 ^c
Synthetic rubber						
1980	30	60	118	na	118	150
1985	26	70	161	na	126	156
1988	25 ^b	77	70 ^b	na	127	152 ^c
Paints and varnishes						
1980	105	244	380	122	416	182
1985	130	262	397	134	408	184
1988	151 ^c	268	406 ^c	139 ^c	404 ^c	178 ^c

a PlanEcon estimates. b For 1986. c For 1987. d Noncellulosic fibers only. na = not available. Source: PlanEcon

playwright and former dissident, would now be President of Czechoslovakia. The political and economic reforms under way in the East bloc have brought Europe closer together. We are pleased that CEFIC has already established some contacts

with chemical industry federations there, particularly in Poland and Hungary."

These organizations include the Hungarian Association of Chemical Industry, and the chemical section of the Hungarian Chamber of Com-

merce, and the Chamber of the Polish Chemical Industry.

"We welcome the opportunity to set up a dialogue with Poland and Hungary," says Hugo Lever, director general of CEFIC. "Providing these countries move further towards a free-market economy, it is probable that in the medium term, the chemical industry associations of these countries could become CEFIC members."

West Germany is moving fastest to form partnerships

West Germany is setting the pace in forming partnerships with companies from East Europe, says Peat Marwick McLintock, a management consulting firm. Some 120 partnerships were formed between West Germany and East European firms in the first quarter of 1990, compared with only 42 in the preceding quarter, the company says.

"The West Germans are there, and their people are looking at the plants, forming joint ventures. The other countries' companies are doing things like setting up sales offices," says Alistair Kilgour, chemicals analyst with BNP Securities, in London.

"At the moment, these assets are not worth much. But an injection of cash and technology would change that. The West Germans' main message is that plants are out of date. But the customer base is there. If they can get hold of assets and a customer base, you can look at it in two strategic ways: on an aggressive side, it gives them new markets; it also is defensive, in a way, because it keeps others out."

Kilgour believes, for example, that the latter is one reason the Belgian producer, Solvay, is so set on regaining the soda ash facilities expropriated in East Germany. Partly it is a deeply felt matter of ownership and justice; the company never relinquished its rights to the soda ash plants. But, adds Kilgour, it is also a defensive move: If someone else got hold of that plant, Solvay's strong position in the soda ash market in West Europe could be shaken.

Meanwhile, the East German chemical industry has set up a trade association, the Verband der Che-

mischen Industrie (association of the chemical industry). That also is the name of the counterpart association in West Germany, which was founded in 1877 in Berlin.

West Germany's VCI, which is now headquartered in Frankfurt, has set up a "Verbindungsstelle"—a unification post—in Berlin, with three staff specially charged with East German concerns. It will focus on the impending union with East Germany, and will serve primarily as a backup partner on environmental questions, providing technology that the West has developed for solving environmental problems to counterpart industry in the East.

Productivity in East Germany—by one estimate, less than half that of West Germany—could realistically double in the next 10 years, predicts German Economy Institute in Cologne. It expects an average increase of 7.2% per year over the next decade. That would bring an average growth rate of 7.5% and a standard of living roughly equivalent to that in West Germany today by the turn of the century. Such growth, the institute adds, could clear up any unemployment problems in East Germany, which are bound to occur as firms struggle to become less overstaffed and more efficient.

West Germany already has the largest chemical industry in Europe, and the East German sector could boost sales by another \$58 billion per year. However, if West German environmental standards are applied, as much as 60 to 70% of East Germany's chemical industry could be forced to shut down, especially chemical plants based on lignite.

In a discussion paper for EC heads of state and government, the European Commission set out implications for the community of German unification, and antipollution measures were high on the agenda. The paper points out that East Germany is one of the last countries still operating a large coal-based chemical industry and that a distinction will have to be made between plants where pollution is too high to be eliminated—ones that will have to be closed—and those to which antipollution equipment could be fitted.

The developed nations have begun working out aid packages to



Poland in brief

Size: 120,727 square miles
Population (1988): 37.9 million
GNP (1988): \$276 billion
GNP per capita (1988): \$7271
World trade:
Imports (1988): \$12.2 billion
Exports (1988): \$14.0 billion
Telephones per 100 people (1985): 12
Automobiles registered per 1000 people (1986): 105

Largest of the East European countries in population and area, Poland is also the richest agricultural country of the region because of its flat, lowland character. It also is rich in mineral resources, such as coal, lignite, sulfur, zinc, lead, and copper, and is highly industrialized as well.

Important industries include shipbuilding, chemicals, metals, motor vehicles, and food processing. Grain, potatoes, sugar beets, and oil seeds are grown in quantity, and livestock also are important. Chief imports include machinery, fuels, and raw materials. Machinery and equipment, coal, steel, and food products are significant exports.

Historically, Poland has been the chief U.S. trading partner in East Europe, but this relationship was hurt seriously following the crackdown on Solidarity in 1981. But most-favored-nation tariff status was renewed by the U.S. in 1987 and recently the government has taken other steps toward economic monetary reform to make foreign investment more attractive. However, most of the 70-odd investments by U.S. firms there remain relatively small.

help East Europe clean up its environmental problems, among other projects. For example, the EC has agreed on a statute to establish a Bank for Reconstruction and Development of Europe.

The EC has also agreed to put together a comprehensive aid package for the environment in East Europe. Training programs and transfer of technology will be key elements in the package, which is likely to cost billions of dollars. The EC called for an environmental code of conduct to be drawn up for EC-based industries locating in East Europe, so that they do not import new problems.

The formal program to give environmental aid to East Europe will be framed at an East-West meeting in Dublin on June 16. The meeting will be the first of any kind at ministerial level between the EC and the new East European countries. It will provide the first detailed balance sheet of the environmental degradation in the East.

Given the serious plight of their economies, East European countries and the Soviet Union have accepted the concept of western market economics, officially accepting the closing document of the first economic conference organized by the 35-nation Conference on Security and Cooperation in Europe (CSCE) in Bonn last month.

The document—which is not legally binding but carries moral weight similar to the CSCE human rights document of Helsinki in 1975—commits the nations to "endeavor to achieve" the following: free and competitive market economies where prices are based on supply and demand; fiscal and monetary policies that promote economic growth and enhance the ability of markets to function efficiently; policies aimed at expanding the free flow of trade, capital, and investment; and the repatriation of profits in convertible currencies.

Jay Mitchell, manager of the Sovi-

et and East European Chemical Service, for PlanEcon, said at the recent London conference that in East Europe, "the trend will be different from Soviet joint ventures—the ventures will be small scale." They also will be focused more on specialty products in such areas as pharmaceuticals, synthetic fibers, paints, herbicides and fungicides, and specialty plastics. "The emphasis will be on specific downstream projects," he adds.

In the Soviet Union, free-market companies have been invited to bid on petrochemical megaprojects—on the \$2 billion project in Tobolsk, western Siberia, with partners including Neste and Hyundai of South Korea; or Shevchenko, about which Dow has submitted a feasibility study which the Soviets are now studying.

In East Europe, however, the projects thus far in the chemical industry have been smaller and more marketing oriented, with a few selected manufacturing ventures. For example, Glaxo Eastern Europe, established to manage and develop the business of Glaxo, the British pharmaceuticals maker, has medical and trade links in Poland, and manufacturing cooperative agreements there for two of its injectable cephalosporin antibiotics. In Hungary, it has a local manufacturing agreement for ranitidine and clobetasol, and has an office in Budapest.

A joint venture by Dutch chemical company Akzo in Hungary is typical of the new breed of venture. Akzo's venture with Tiszai Vegyi Kombinat will produce coatings in Leninvaros. Akzo will have a 51% interest; the plant will begin production by the middle of this year. It will supply the Hungarian market with a full range of coatings and finishes, including resins, with an emphasis on coatings for industrial applications and for the auto industry.

"This is not a small thing," says Willem E. Kulsdom, director for geographical coordination at Akzo. "It fits well with our strategy, and meets the yardsticks of finance and support of our core business units—but also, the project is interesting for both sides. It provides Hungary an opportunity to buy products locally with Akzo technology, to add value

to their manufactured products for exports. These will be indirect exports for us. We are giving added value."

And Dow Chemical is building a new plant in Hungary, also, in a \$14 million to \$15 million joint venture with Nitrokema and Chemolimpex, agreed upon in June 1989, in which Dow has a 50% interest. According to René Wildi, Dow Europe vice president, the plant will produce the company's Styrofoam—extruded polystyrene for foam insulation. "Construction is now under way, and we expect it to go on stream, as scheduled, in early 1991," he says. "It is on time, and on budget—that is very important, particularly when you talk about your first such investment."

In part, western chemical companies have to be alert to investment opportunities that open up—or work to make them open up, if only to follow their customers. As western automakers flock into major joint ventures with their East European counterparts, for example, suppliers of coatings, parts, lubricants, and the like must be there as well. Even when they have already been there, they must be prepared to meet new market needs. For example, auto coatings producers like the U.S.'s PPG Industries and Herberts, the paint subsidiary of Hoechst, have begun demonstrating their fashion coatings line to eastern automakers, who, before, had clung dogmatically to the notion of drab, solid colors.

On the other hand, ventures have not been all one way. In February, Dyno Industries, the Norwegian chemicals and explosives company, and AHB Chemie, the East German chemicals trading company, formed a 50-50 joint venture to make formaldehyde resin in Gent, Belgium, to supply the particle board industry. The new plant, due on stream by mid-1991, will replace deliveries from a Dyno plant in the Netherlands that is scheduled to be closed next year and from Leuna Werk, AHB's plant in East Germany.

According to Dow's Wildi, one of the major changes expected—a wholesale shift away from centralized buying in East Europe—still is to come.

"In most countries, there are reported to be changes in the approach to running the chemical industry, but they have not happened yet, maybe with the exception of East Germany," he says. "The decentralization, if it comes, will create tremendous problems for us, and our customers as well. Among the difficulties: ensuring that there is a common commercial language."

"If you go back to the U.S.S.R., they said two years ago that the foreign trade organizations would be eliminated. But now, more than 90% of the business still is being handled by these organizations."

A West German chemical executive identifies a major, positive shift. "In the past, you could only work with the ministries or foreign trade organizations. You had no opportunity to come together with the plant people, unless there was a big technical problem, for example. They felt it was not necessary to get together on the sales side. Sometimes, it was done anonymously—but at risk. Now it is much different."

It is still worth the patience, however, contends Akzo's Kulsdom, to tap into the reservoir of trade expertise. "We should realize that in East Europe, there is a huge experience in trade between Comecon partners. A huge marketing knowledge, although not in our terms or our understanding of marketing—knowledge of existing conditions, and existing demand. People may change, but the expertise is there."

Selling in East Europe, most chemical companies agree, is best done with the company's own sales staff. As Marc G. Schriber, Du Pont International's director for East Europe, puts it, "Sales representatives have trouble investing two or three years in an industry. They have to have commissions in each month. But to us, the two or three years is our daily bread. To develop long-term, we must do it ourselves. We can train our people much better."

Whoever does the selling or market development work, however, has quite a job, Schriber adds. "It takes a lot of skills to serve a customer in the East. For example, first, you have to find out who the customer is. There is no switchboard, there are no telephone directories. A lot of

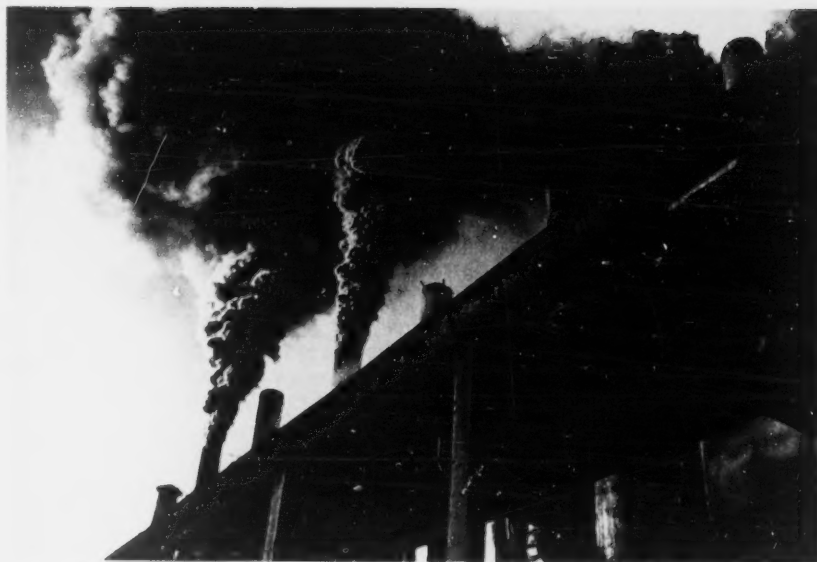


Photo by Black Star's Andrew Holbrook

Carbon black plant belches air pollution at Copsa Mica, Romania

knowledge on how to do business—trivial but crucial—can be picked up only over many years' experience."

Direct product selling is one thing; selling licenses or setting up joint ventures is another, for a particularly important reason for the chemical industry: intellectual property rights and patents. So far, however, it is a topic not satisfactorily addressed by the governments of any of the East European countries.

Says one industry executive, "Intellectual property is a field not touched yet. We used to complain about it, in the past. They are well aware that a market economy—which they all want to have—must have protection of intellectual property. But they have not really touched the problem yet. They are too busy working on things like convertibility of currency, and full employment. They will have to touch on it, though, because investors will ask them."

Environmental problems are frustrating for western companies, industry officials agree. Technology that now exists to clean up pollution problems often is too expensive to be afforded—or local bureaucrats find it impossible to make the ultimate decisions to go for cleanup. And a rising green movement within East Europe is having its effect: Although there are

clean technologies in the chemical industry, some analysts believe, the East Europeans have been so traumatized over the past 40 years that no technology can be clean enough for them to accept.

Until six months ago, the issue really was only Russia—perestroika and glasnost and their impact on the global balance of power or the nuclear arms race, according to Martin J. Kallen, corporate vice president of Monsanto and chairman and managing director of Monsanto Europe. Things are much more complex now, he agrees, but he believes the U.S.S.R. is still the key, a magnifying mirror for conditions elsewhere through East Europe.

The Soviet Union, of course, has its own problems in the size of its

country. But other East European countries share a diversity in people and climate, ethnic problems, drought problems and wind-driven soil erosion in agriculture, inadequate infrastructure, the poor health of the people, declining life expectancy, the drabness of life, and instant antiquity—"a plant built two years ago looks 40 years old," Kallen said, at a recent speech to the American Club in Brussels.

How each country restructures its industries and their links with research institutes will probably go a long way toward helping solve that problem. For Hungary and Poland, the answer is to get the industry privatized, even if that means into foreigners' hands. At least one executive has predicted that within 10 years, for example, much more than half of Hungary's chemical industry will have non-Hungarian ownership.

And the Polish Minister for Industry said recently, when meeting with a British trade delegation, "In Poland, 99.9% of the property is owned by the state, and somebody has to sell it," reports John C. Mitchell, head of East European affairs for ICI.

There are serious and significant problems facing investors contemplating investing in East Europe, says Mitchell. But, as he told the Commercial Development Association in New York earlier this year, "It is no longer an option to omit

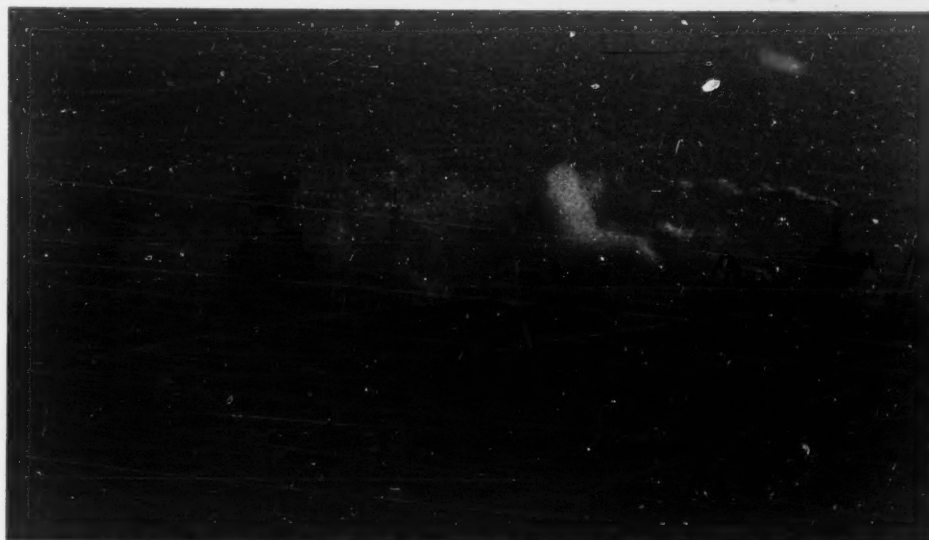


Photo by C&EN's Ward Worthing

A major Romanian plant for fertilizer is at Tarnu-Mărgurele, on the Danube

consideration of the U.S.S.R. and East Europe from global business or product strategies. The days when that option was available have disappeared under the avalanche of change and exposure to which part of the world is now being subjected."

It's not really a revolution that the region is going through, Mitchell adds, but a "long-term transition only now started. The question is, is the chasm leapable? You can't leap a chasm in two leaps. What you have in Eastern Europe is chaos, accelerating chaos."

With the long-term orientation needed for East European investment, companies believe they can afford to be cautious in the short term. "What happens over the next four to five years will be interesting but not terribly large," predicts H. M. Rowson, director at Trichem Consultants Ltd., in London. "There won't be big money going into the East bloc until people think the politics are more secure."

A report from the United Nations Economic Commission for Europe, published last month, says East Europe cannot absorb large amounts of foreign financial aid, partly because the necessary physical and institutional infrastructure is lacking. The Marshall Plan package of mostly grant aid with a small proportion of technical assistance "should be turned on its head," the report says.

Another report, however, from four leading European economic research institutes—Cambridge Econometrics, BIPE of Paris, Prometia of Bologna, and IFO-Institut of Munich—said last month that East Europe's switch from communism to capitalism will enlarge the region's need for imports. In fact, the report said, EC exports to East Europe will become more important than exports to North America by the end of the century.

Even with a loose trading organization such as CMEA or with trade agreements, there has been duplication of effort, notes Terry F. W. Baker, a principal with Chem Systems Ltd., in London. "Eastern Europe is the fourth-largest petrochemical producing area, but all the companies there have aimed at self-sufficiency."



Metz: reforms in the East have brought Europe closer together



Kulsdorn: joint venture in Hungary fits well with firm's strategy



Wildi: no wholesale shift from centralized buying in the East yet

Two years ago, Chem Systems began a major multiclient study, "East European Petrochemicals: Impact on the West," which it finished last July. Among the major conclusions of the study is the unsurprising fact that plants don't run at capacity, but rather probably at only about 80% of capacity. "They have the potential to produce more at their existing plants, but they don't have the feedstocks," Baker says. Moreover, because the various ministries have paid for the plant, there is no element of capital costs—no capital return concept. "The incentives have been in terms of maximizing volume, not quality, and there has been no incentive to improve quality of factories."

However, the region is set to grow, and grow fast, Baker believes. "This is a population with expectations: They are Europeans, and they want a comparable standard of living to West Europe. They don't want things just a bit better than before, they want the freedoms of West Europe, the goods of West Europe. Look at West Europe at the end of the war—and then look at it 20 years after the war. East Europe, given the same sort of aid and incentives, could achieve the same sort of growth and recovery. It may have to pull down polluting factories—but is that worse than if they had been bombed and had to be rebuilt from scratch?"

Baker and Chemicon Surveys' Cox point out one of the fundamental problems with the industry in East Europe: its size, or—more precisely—lack of size.

Individually, each country is rather small. Says Baker, "To be an effective economic block, these countries will have to get together some way—a trade network, perhaps—something to sustain a whole range of industries, to give a critical mass, to sustain industry at a West European standard of living. We figure, for example, it takes about 10 million people to sustain an ethylene cracker."

So the question has to be asked: Is there a need for a chemical industry in each country? According to Cox, the existence of a basic chemical industry in each country is a relic of Stalinist economic planning, such

that each country should have its own petrochemical industry, its own steel industry, its own whatever. However, if one starts looking at each country as a separate unit, there are few with the significant indigenous resources to support a basic chemical industry and few with a large enough domestic market.

It is not outside the bounds of reason that, eventually, the states will decide to encourage resources spent on more profitable, high-value added parts of the industry, and to shift away from basic chemicals. A possible role model: Ireland, which has encouraged a specialization in pharmaceuticals.

The problem facing the industry in East Europe is simple: It must justify its existence. It must justify why companies should include the region in their strategic investment planning, most of which is worked out for three to five years in advance.

It must particularly justify itself as a candidate for investment funds in competition with other areas that have more immediate promise, with less remedial work: areas such as Spain and Portugal or Southeast Asia, all of which are figuring high on corporate investment plans.

East European countries will find themselves facing the need to put together packages of incentives to attract companies to build there. Points out Chem Systems' Baker, "There still will be competition between countries to get better investment terms—even somewhat more so than the way states or regions compete in the U.S. The stimulus will come from investment and outside expertise—to build factories and run them, to get things going."

Adds Akzo's Kulsdorn: "There must be a prospect for reasonable profit and return in [the] foreseeable future. No company would be satisfied with not getting profits for 10 years. Most of our strategic investment planning is over a period of about three to five years. Perhaps there will be some other considerations for East Europe, but there won't be a completely different yardstick. Any activity should bring a reasonable profit, including any investment in East Europe."



Czechoslovakia in brief

Size: 49,365 square miles

Population (1989): 15.7 million

GNP (1988): \$158.2 million

GNP per capita: \$10,130

World trade:

Imports (1988): \$24.2 billion

Exports (1988): \$24.9 billion

Telephones per 100 people (1985): 23

Automobiles registered per 1000 people (1986): 173

Czechoslovakia is a federation of the Czech (Bohemia and Moravia) and Slovak republics whose location in the heart of Europe has led it to play a significant economic, political, and cultural role in the continent's history. About two thirds of its citizens are Czech. Although not rich in natural resources other than coal, the country has one of the most advanced economies in East Europe and is highly industrialized.

Machinery, steel, glass, chemicals, cement, motor vehicles, and military equipment are important products. Major imports include machinery, raw materials, and consumer goods. Leading exports include machinery, steel, glassware, and chemicals.

Long-strained relations with the U.S., stemming from Czechoslovakia's hard-line communist policy now have eased markedly. Legislation permitting foreign investment was passed for the first time in 1987, but little had been done to encourage such investment while the communist government was in control.

U.S. chemical firms look eastward

If business officials in West Europe are still uncertain about their role in East Europe, their colleagues in the U.S. are even more so of two minds about prospects there.

"Political and economic reform in East Europe is transforming one of the most stagnant areas of the world into one of mind-boggling opportunities," says Carla A. Hills, the U.S. Trade Representative. On the other hand, Paul McGonagle, a senior vice president of the First National Bank of Chicago, warns, "Political and economic reform (in East Europe) cannot be predicted. The perceived risk has increased."

Hills and McGonagle could both be right. The political and economic upheaval that has swept East Europe could, indeed, present U.S. companies with mind-boggling business opportunities. But there is no doubt that those opportunities come attached to a high degree of risk.

As a result, the euphoria that blossomed from East Europe's initial leap out of rigid, socialist regimes into a free, market-based society has been replaced with caution. Indeed, U.S. business executives, including those in the chemical industry, use the word "caution" much more often than "unbounded opportunities" in describing how they feel about U.S. business potential in East Europe.

The other key word in discussing business opportunities in East Europe is "patience." Only the naive expect to make quick profits there.

Richard M. Patterson, government relations manager for Dow Chemical U.S.A., noting the lack of resources in East Europe and the depressed state of the economies there, asks, in fact, where are the opportunities? He concedes that there is consumer demand. But he wonders if income levels are there to make the purchases.

If gross domestic product goes up and things don't collapse first, says

Patterson, eventually there will be markets in East Europe for western companies to satisfy. Take a snapshot of business opportunities there today, and it is not a pretty picture, he says. Take it five years from now, and the picture will look better. Take it 10 years from now, says Patterson, and that picture could look positively attractive.

Max L. Turnipseed, Ethyl's manager of international affairs and special trade adviser for the Chemical Manufacturers Association, believes that there are opportunities for U.S. chemical companies in East Europe. But, he says, it will be a long time before U.S. companies feel comfortable pursuing them.

"There's always a political risk there," says Turnipseed, "but the rewards can be high if you're willing to take the risk." And he quickly adds that if U.S. companies don't take that risk, "our European and Japanese friends will."

Jay K. Mitchell, manager of Soviet & East European Chemical Services at PlanEcon, agrees that European companies probably have a leg up on U.S. companies in East European business dealings. And he agrees that Japanese companies have their eye on opportunities in East Europe.

Japanese companies, he points out, are heavily invested in West Europe's industrialized countries, and they are already moving into East Europe. They have one big trump card, says Mitchell, and that is money. They also have patience.

There's still a lot of uncertainty about East Europe that makes weighing risk against opportunity difficult. Geza Feketekuty, a former counsel to the U.S. Trade Representative, says that no one really knows what is going to happen. "We are fairly sure of the direction of change [in East Europe]," he says, "but the pace and precise nature of the change is unclear."

It's a safe bet that most of the East European countries will emerge from their transition process near bankruptcy and heavily in debt. Despite the progress, political vacuums still exist in some countries. Everyone agrees that East Europeans will need "things," but wonder where



Schriber: a lot of skills are needed to serve customers in the East

they will get the money to pay for them.

The problems seem endless. Nevertheless, Feketekuty believes that investing in and trading with East European countries will be worth the risk. Like many others, he points out that U.S. companies can enter those markets now at high risk, but with big payoffs. Or they can wait until the political and economic dust settles. Then, the risk will be lower, but so will the payoff.

Peter Orenski, president of TME Co., a consulting company in New Milford, Conn., is much more optimistic about East Europe than he is about the Soviet Union. Orenski, a former Union Carbide employee who founded TME, describes himself as "Dr. Death" when it comes to advising his clients about doing business in the Soviet Union.

He tells them that unless they have a strategy that stretches to the 21st century and deep pockets, go to the U.S.S.R. only as a tourist. "Otherwise, you'll lose your shirt," he says.

He believes that East Europe is a different story. Countries there, he says, are less likely to be concerned with dumping communism than the Soviets are. In East Europe, communism was an unwelcome intruder.

What distinguishes East Europe from the Soviet Union, says Orenski, is that the East Europeans have what he calls "a social contract" to

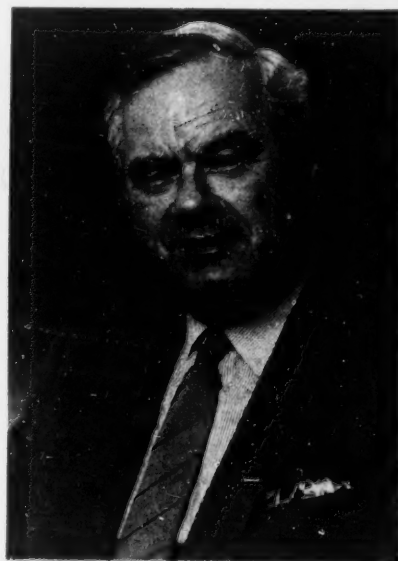
shed communism and rejoin the world of democracy and market economies. As Orenski sees it, East Europeans are saying to each other, "Let's suffer together for five years or so through this transition so that we can have a better future."

Social contract or no social contract, the transition will be a difficult and painful task. East European countries will need financial help from the West, both from public and private sources.

Indeed, money from the West already has started flowing into East European countries. Western governments are providing financial aid directly, through international lending agencies, such as the World Bank, and to private organizations to encourage trade with or investment in East Europe.

One of the U.S. government's major aid efforts was launched last year when Congress passed the so-called SEED Act (Support for East Europe Democracy). The SEED Act authorizes a three-year, \$928 million assistance program specifically for—and only for—Poland and Hungary. Before the funds become available, Congress must appropriate them each year. For fiscal 1990, Congress has already appropriated \$536 million.

The SEED Act is a wide-ranging



ICT's Mitchell: in East Europe, accelerating chaos

piece of legislation, with 25 distinct provisions falling into six broad categories. Several different government agencies are responsible for handling the money, but most of the funding is handled by the Agency for International Development (AID).

Funds are provided for "structural adjustment," private-sector development; trade and investment; educational, cultural, and scientific activities; and other assistance programs. One of the most important is private-sector development. The SEED Act authorizes \$240 million for a newly established Polish-American Enterprise Fund and \$60 million for a Hungarian-American Enterprise Fund.

For fiscal 1990, \$45 million and \$5 million have been appropriated for the Polish and Hungarian funds, respectively. Although these funds, which are private, nonprofit organizations, will receive the money from AID, a board of directors governs the funds themselves. The board of directors includes private citizens from both the U.S. and the host country. The organizations will use the money to provide loans, equity investment, feasibility studies, technical assistance, and training to private-sector groups in Poland and Hungary.

Although the SEED Act provides funds only for Poland and Hungary, some Congressmen and Administration officials are considering a SEED Act II, which would extend financial aid to other East European countries.

U.S. financial aid, however, comes in different shapes and sizes. Direct authorized assistance that the SEED Act provides is only one of them. The U.S. also makes contributions to international lending agencies such as the World Bank, the International Finance Corp., and the International Monetary Fund.

The Administration is drawing fire, however, over its proposal to participate in a new European Bank for Reconstruction & Development. The bank is set up as a regional development bank for East Europe and the U.S.S.R. But opponents in the U.S. complain about Soviet participation. They fear that the Soviets will divert resources from the bank that they would prefer to see going

Most of East Europe's chemical trade is with other European countries

World chemical trade, \$ millions	Exports to					
	World	East Europe	U.S.S.R.	U.S.	West Europe	Japan
EXPORTS FROM						
World						
1980	140,748	4513	4877	7,895	71,318	5346
1985	152,111	5299	4893	13,382	71,431	6804
1987	214,814	7038	6195	16,047	109,230	9750
East Europe						
1980	6,013	1178	1703	51	1,698	52
1985	7,979	1355	2127	146	1,958	72
1987	9,283	1715	2779	159	2,098	88
U.S.S.R.						
1980	1,704	614	—	116	505	5
1985	2,772	1033	—	195	632	60
1987	2,945	1422	—	136 ^a	534	50
U.S.						
1980	20,728	58	31	—	6,230	1972
1985	21,255	87	282	—	6,375	2849
1987	25,631	79	264	—	7,525	3366
1988	31,343	68	268	—	8,778	3937
West Europe						
1980	90,288	3455	2528	3,845	58,716	1778
1985	91,671	2307	1702	6,575	57,647	2341
1987	137,844	3157	2310	8,332	92,127	4311
1988	158,211	3308	2352	9,895	105,712	5088
Japan						
1980	6,619	90	322	769	876	—
1985	7,542	67	256	1,404	1,111	—
1987	11,545	95	329	2,086	1,978	—
1988	13,904	93	357	2,303	2,520	—

Note: Does not include trade between East and West Germany. Some East Europe and U.S.S.R. data may be suspect because of problems in converting from nonconvertible currencies to dollars. ^a 1986. Source: United Nations

to the fledgling democracies in East Europe.

Meanwhile, other U.S. government agencies are involved in lending to or insuring U.S. business with East European countries. One of them is the Overseas Private Investment Corp. (OPIC), an independent government agency. OPIC assists U.S. investors by making direct loans and/or loan guarantees to finance investment projects overseas and insures foreign investments against a wide range of political risks.

Another is the Export-Import Bank (Eximbank), which finances export sales of U.S. firms. Eximbank recently extended short-term credit insurance to cover U.S. exports to Poland and opened all of its programs to U.S. exports to Czechoslovakia. Meanwhile, Congress is considering a bill that would permit Eximbank to extend medium-term, as

well as short-term, direct loans to public and private enterprises in Poland that want to buy U.S. goods.

John D. Macomber, chairman of Eximbank, says it and its counterpart export credit agencies in other industrialized countries are a significant source of capital for developing countries, including countries in East Europe. The World Bank has \$250 billion outstanding in loans. Less well known is that western countries' export credit agencies collectively have \$220 billion outstanding. About \$16 billion of this is in the six East European countries.

There is a lot of money available to help companies from the U.S. and other western countries who want to start doing business in East Europe. Deputy Secretary of State Lawrence S. Eagleburger, who is coordinating U.S. assistance efforts, estimates that as a ballpark figure, "about \$10 to \$15 billion of multilat-

Communist countries face a big challenge in putting their chemical industries into private hands

Sales (1989), \$ billions	State-owned companies	Privately owned companies	Publicly owned companies	Joint ventures with foreign companies	Total
Communist countries	\$85	—	—	\$20	\$105
West Europe	50	\$50	\$205	—	305
U.S. & Canada	—	30	210	—	240
Japan	—	30	50	55	135
Middle East, India & Africa	20	15	10	10	55
Latin America	23	5	10	2	40
Southeast Asia & Australia	15	5	10	10	40

Source: Shell

eral aid will probably flow into East Europe over the next few years in the form of direct assistance, investment, and possible debt restructuring. Of this, \$1.2 billion would be overall assistance from the U.S."

The Administration has other irons in the East European fire besides financial aid. It has been busy negotiating trade and investment agreements with several East European countries, agreements that should benefit U.S. companies. And it has been "conditionally" supporting some East European countries' attempts to join such global organizations as the General Agreement on Tariffs & Trade and the International Monetary Fund.

U.S. trade and investment policy toward East Europe is coordinated by the interagency Trade Policy Review Group, which is chaired by the U.S. Trade Representative. Peter Allgeier, assistant USTR, says the goal is simply to establish normal economic relations with East European countries. Exactly how the U.S. does this depends upon how fast

and how far these countries go in setting free elections, establishing a market-based economy, and respecting human rights.

It also depends on whether the U.S. already grants an East European country most-favored-nation (MFN) tariff treatment. MFN is the cornerstone of most trade in the western world. Basically, it means that tariff concessions granted to one country will be granted to all MFN countries. Exports from countries that do not enjoy MFN treatment usually carry much higher tariffs. Obviously, any country, East European countries included, would welcome MFN treatment for its exports.

Under Title IV of the 1974 Trade Act (the "Jackson-Vanik" amendment), MFN is denied to countries that have restrictive emigration policies. And before the U.S. can grant MFN to Czechoslovakia, East Germany, and Bulgaria (and the Soviet Union,) it must negotiate "Title IV" commercial agreements with these countries.

Last month, the U.S. and Czecho-

slovakia signed such an agreement. But even with Title IV agreements, the U.S. must withdraw MFN treatment if a country's emigration policies become restrictive.

That would leave Bulgaria and East Germany still without MFN privileges. Bulgarian and U.S. trade officials have met to discuss the possibility of a Title IV agreement. But these discussions are very preliminary. The State Department is still reviewing Bulgaria's emigration situation to see if the country merits a waiver of the Jackson-Vanik amendment.

The U.S. hasn't held trade agreement talks with East Germany. It, along with the rest of the world, is waiting to see what happens about reunifying the two Germanys. Believing that this could happen soon, Allgeier says the U.S. probably will not seek a separate trade agreement with East Germany.

Poland and Hungary already enjoy MFN status with the U.S. Romania had been granted MFN status, but the Ceausescu regime renounced it in 1988 after the U.S. criticized its human rights performance.

Poland also benefits from the Generalized System of Preferences (GSP), which allows a country's exports to enter the U.S. duty-free if the country and product meet certain conditions. Poland doesn't require a Title IV agreement because of its MFN status, but President Bush and Prime Minister Tadeusz Mazowiecki signed a comprehensive "business and economic" treaty in March.

U.S. trade officials also have talked with Hungary about a similar agreement. Like Poland, Hungary has MFN and GSP from the U.S. But, unlike Poland, Hungary is subject to the Jackson-Vanik amendment.

Despite these trade agreements, the U.S. can't completely normalize its trade relations with East European countries so long as the Jackson-Vanik amendment slaps conditions on how the U.S. grants MFN status. GATT requires unconditional MFN treatment, which the U.S. can't promise.

Hungary, Czechoslovakia, and Romania are members of GATT. So, too, is Poland, but Jackson-Vanik re-

West Germany dominates the European Community's chemical trade with East Europe

Imports of chemicals to EC, 1987			Exports of chemicals from EC, 1987	
	Leading importer	Value to that country, \$ millions	Leading exporter	Value from that country, \$ millions
Bulgaria	Greece	\$ 3.5	Italy	\$18.2
Czechoslovakia	West Germany	22.5	West Germany	26.7
East Germany ^a	Italy	22.7	Netherlands	9.3
Hungary	West Germany	11.1	West Germany	23.4
Poland	West Germany	33.2	Ireland	31.5
Romania	Italy	9.0	West Germany	22.9

^a Excludes trade with West Germany. Source: European Community

strictions don't apply to Poland. The conflict between GATT rules and Jackson-Vanik requirements complicates U.S. international trade relations. Bulgaria has been a GATT observer since 1967 and has applied for membership.

Despite all the government aid and actions, by the U.S. and other western countries, the widely held opinion is that private western investment in East Europe will be more important in ensuring a complete transition to market economies.

But private groups will be cautious about committing funds to East Europe. For instance, the Institute of International Finance recently warned that East Europe shouldn't expect international commercial banks to take the lead in financing its economic reforms.

The institute says that banks will be cautious about making long-term loans to government-owned enterprises in East Europe. They are afraid that they may get hit with the large losses they suffered in lending to Latin American countries.

For manufacturing companies, including chemical companies, the most likely route to investment in East Europe will be through joint ventures.

Dow's Patterson says, for instance, that its joint-venture investment in Hungary, to make polystyrene foam insulation products, makes sense because the investment climate there is favorable. There is also a big demand for foam insulation in the Hungarian building and construction industry. To develop the market, Dow has been exporting the product to Hungary to acquaint architects and builders with the material.

According to a recent Department of Commerce tabulation, U.S. companies have 216 joint ventures in East Europe, with more than half of them in Hungary. But that number pales beside the almost 2000 joint ventures that have been formed in East Europe by all western companies.

PlanEcon's Mitchell, however, believes that U.S. chemical companies can be competitive in forming joint ventures in East Europe. And he believes that they are doing a better



Hungary in brief

Size: 35,919 square miles

Population (1987): 10.6 million

GNP (1988): \$87.5 billion

GNP per capita (1988): \$8178

World trade:

Imports (1988): \$4.32 billion

Exports (1988): \$5.40 billion

Telephones per 100 people (1985): 14

Automobiles registered per 1000 people (1986): 145

Hungary is a mountain-rimmed country dominated by a great fertile plain and bisected by the Danube River. It has a mixed agrarian-industrial economy but relatively few mineral resources.

Steel, machinery, pharmaceuticals, motor vehicles, communications equipment, food processing, and distilling are major industries. Grain, vegetables, fruits, and grapes are leading crops and livestock are also a significant agricultural product. Hungary's leading exports include machinery, transportation equipment, consumer goods, and agricultural products. Major imports are raw materials, fuels, and machinery.

Hungary has been in the forefront—since 1968—in economic reform now taking place in East Europe. It launched the region's first aggressive program of privatization in 1989, and also has taken the lead in liberalizing foreign investment rules and building trade relations with the European Community and other western countries. More than 100 U.S. companies have established joint ventures or subsidiaries in Hungary, and the pace of foreign investment has continued to quicken.

job than U.S. companies in other segments of manufacturing.

But it isn't easy. Ethyl Corp.'s Turnipseed says that his company worked for years to form a joint venture in Czechoslovakia, but finally gave up when it realized that there were too many obstacles. He declines to say what the joint venture would have produced. From a marketing and technical viewpoint, says Turnipseed, the project looked fine. But "the uncertainty did it in," he says.

John R. Dearborn and Richard M. Sol agree that establishing joint ventures in East Europe is difficult. The two have had extensive East European and Soviet dealings as licensing manager and director of licensing sales, respectively, for Union Carbide's Unipol Systems Department. Says Dearborn, "The more I learn, the more questions I have."

Dearborn says the major changes occurring in East European countries make matters even more confusing. Power is being transferred

out of ministries into production centers, which makes it difficult to know who is in charge of what.

Sol repeats the warning that negotiating joint ventures in East Europe takes a lot of time and effort. "Don't expect to sign a deal in two weeks," he says.

Dearborn agrees. He says that, when he was in the Soviet Union, it was a year before he fully understood how to go about business there. The situation is not much different in East Europe.

Carbide has sold Unipol polyethylene and polypropylene plants in the Soviet Union, as well as polyethylene units in East Germany and Czechoslovakia. It is now negotiating with Poland and East Germany for additional units.

Sol says that there may be potential for U.S. chemical companies to establish joint ventures in East Europe, but warns them that it will be a long-term commitment. "Many have tried the fast track and failed," he says.

Poland is biggest East European customer for U.S. chemicals

\$ Millions	1988	1987	1986	1985	1984	1983	1982	1981	1980
Bulgaria									
U.S. chemical exports	\$ 5.9	\$ 9.3	\$ 10.6	\$ 9.1	\$ 16.2	\$ 13.3	\$ 13.9	\$ 36.5	\$ 12.2
U.S. chemical imports	9.9	5.8	3.5	4.5	3.5	1.2	1.5	0.9	0.5
Balance of chemical trade	-4.0	3.5	7.1	4.6	12.7	12.1	12.4	35.6	11.7
Czechoslovakia									
U.S. chemical exports	3.8	9.0	19.4	23.4	16.5	17.7	2.1	2.2	3.7
U.S. chemical imports	2.5	2.4	2.0	1.2	1.4	3.0	4.1	1.5	1.5
Balance of chemical trade	1.3	6.6	17.4	22.2	15.1	14.7	2.0	0.7	2.2
East Germany									
U.S. chemical exports	2.3	2.9	2.1	1.0	3.2	1.5	1.2	3.2	8.8
U.S. chemical imports	27.1	18.3	27.3	8.7	17.5	9.8	6.2	5.1	4.7
Balance of chemical trade	-24.8	-15.4	-25.2	-7.7	-14.3	-8.3	-5.0	-1.9	4.1
Hungary									
U.S. chemical exports	18.4	18.7	12.7	11.9	12.7	9.7	14.6	15.9	9.2
U.S. chemical imports	21.6	26.8	28.4	21.7	11.7	10.7	6.4	7.3	5.9
Balance of chemical trade	-3.2	-8.1	-15.7	-9.8	1.0	-1.0	8.2	8.6	3.3
Poland									
U.S. chemical exports	32.4	29.2	29.5	30.4	7.5	10.1	32.2	12.1	16.9
U.S. chemical imports	29.0	11.1	6.7	4.7	4.6	5.6	8.6	15.3	22.6
Balance of chemical trade	3.4	18.1	22.8	25.7	2.9	4.5	23.6	-3.2	-5.7
Romania									
U.S. chemical exports	5.8	10.7	22.7	10.9	10.8	13.9	14.0	5.5	5.5
U.S. chemical imports	11.8	6.8	95.1	141.6	78.0	22.6	6.3	6.8	10.3
Balance of chemical trade	-6.0	3.9	-72.4	-130.7	-67.2	-8.7	7.7	-1.3	-4.8

Source: Bureau of the Census

PlanEcon's Mitchell expects the number of East-West joint ventures in East Europe's chemical industry to increase. Right now, he says, European companies seem to have the edge. But he insists that U.S. companies can, and are, making inroads.

East Europe a mixture of weaknesses and strengths

Whether it's a government hand-out, private financing, or investment through joint ventures, there's little doubt that these countries can use all the aid they can get—probably more than they will get from the West. They must endure the trauma of converting from their old socialist system to a market-oriented system. And they must do it while starting from an industrial base that has been beaten into the ground after 40 years of communist rule.

In East Europe some countries are in worse shape than others. As a result, TME's Orenski has what he calls a "worry list" and a "positive list." The Soviet Union heads his worry list, but Bulgaria and Romania also are well-entrenched on it.

He characterizes Bulgaria as a big unknown—"a mystery wrapped in an enigma." Bulgaria has been called worse things—the backwater of East Europe, for instance.

Prospects for reform in Bulgaria are not so bright as in other East European countries. It is the least developed of those countries. And European-style political and economic traditions are missing.

Bulgaria doesn't have the strong ties with the West that other East European countries, such as East Germany and Czechoslovakia, have. And whereas Hungary has neighboring Austria to hold its economic hand, Bulgaria has no such partner.

Communists still rule in Bulgaria. But, relatively unnoticed, Bulgaria has enacted some major economic reforms in the past two years. These reforms include legal rights for private enterprise and a foreign investment law that provides for 100% foreign ownership.

Bulgaria is a relatively minor chemical producer in East Europe. That chemical stature shouldn't change much in the near future. Its small population doesn't trigger

much chemical demand. Its chemical industry is outdated and dilapidated. Production of many chemicals has been declining since 1985, particularly polyvinyl chloride since the Devnia PVC plant was destroyed accidentally in 1986.

Recently, Bulgaria's chemical exports have been running about 3% of total exports, which is a very small share. Its chemical exports to the industrialized West have been the smallest of any East European country by far. In fact, Bulgaria ran a chemical balance of trade deficit of \$372 million with the industrialized West in 1987.

Like Bulgaria, Romania still hasn't decided exactly what to do about a free market future. Its political situation still is in flux and there is no clear political leader. Dow's Patterson calls Romania "a disaster." He adds, "It will be a long time before it gets its act together."

Debtwise, Romania is in good shape to borrow. But it will need massive amounts of money to restore its crippled economy. What's more, Romania's reputation has been tarnished. There's a limit to the

aid that the West can provide to East Europe, and Romania may be at the back of the line.

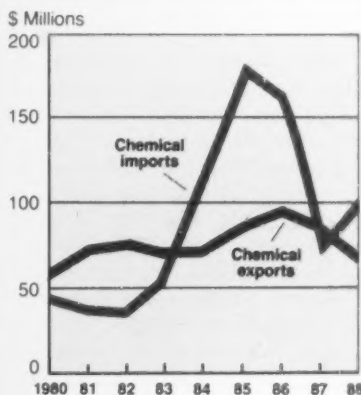
Chemical production statistics are scarce for Romania. What there is probably overstates production and production growth rates. Nevertheless, the data show that the chemical industry has grown even more slowly than other major industrial sectors. In fact, output of practically all chemicals has dropped since 1985. "Output has probably fared even worse for the chemicals not reported," says PlanEcon's Mitchell.

Mitchell says Romania has fewer chemical plants being supplied their raw materials by western firms than any other East European country. To him, that's a sure sign that Romania's chemical industry is falling even further behind those of its East European neighbors.

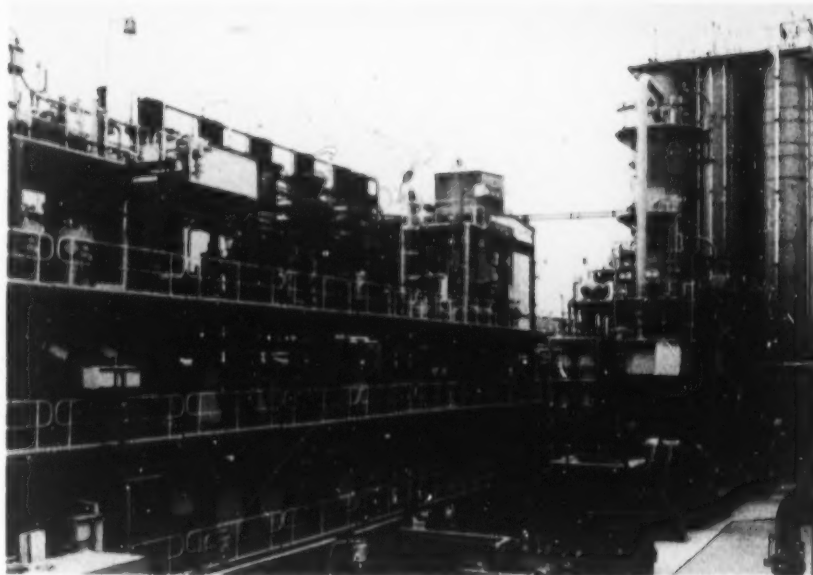
Now that Romania's hard-currency debt has been repaid, Mitchell believes that the country's chemical industry may be able to attract at least some of the large amounts of funds that it desperately needs to modernize and expand. But many westerners are still wary of Romania. It may be years before Romania will be able to offer attractive lures to investors.

Orenski calls Romania a "wild card." It has had a checkered past with no guarantee that it can make it on its own. Of the six East European countries, he believes Romania is the riskiest bet.

U.S. has had a deficit in East European chemical trade



Source: Bureau of the Census



High-density polyethylene plant is licensed to use Carbide's Unipol process

On Orenski's "positive list" are Poland, East Germany, Czechoslovakia, and Hungary. Of East Germany he says, "Invest if you like, but good luck. The West Germans already have it locked up."

He advises companies to be cautious about Poland. Poland's infrastructure, he says, is old and in poor condition. And, he adds, the risk of the Poles saying "no" to their experiment in democracy is great.

Orenski says Czechoslovakia and Hungary are probably the best bets for U.S. business executives. Both nations have a western-style infrastructure and a tradition of strong, industrialized market economies.

He picks Czechoslovakia ahead of Hungary only because there are fewer investors already there. Before World War II, Czechoslovakia was one of the most industrialized countries in Europe, about in the same league as Belgium. Even during 40 years of socialist rule, many Czechs were able to keep alive an entrepreneurial spirit.

The country is as well managed as any in East Europe and has a low foreign debt. Although Czechoslovakia trails Hungary in statutes on the books geared toward a market economy, observers expect it to catch up. Reforms likely will accelerate after the June elections.

Economically, Czechoslovakia is not in the best of shape, but its chemical industry is one of the largest and most rapidly growing branches of its industrial sector.

Not surprisingly, the Czech chem-

ical industry is becoming increasingly obsolete. Producers have problems operating their plants at capacity and maintaining product quality. One indication, however, that Czechoslovakia intends to modernize its chemical industry is the rapid growth of the more advanced synthetic fibers.

Hungary is probably further down the road to a market economy than any other East European country. It certainly has been at it longer. Since 1968, despite many fits and starts, Hungary has been in the forefront of East Europe's economic reform.

It was the first East European country to begin an aggressive program aimed at privatization. It has pushed for currency convertibility and hard-currency trade relations within CMEA. Government officials have spoken publicly about closer ties with, and even eventual membership in, EC.

Despite Hungary's strong efforts at reform, its economy has been disappointing over the past two years. Gross domestic product, of which two thirds still passes through the central budget, stagnated. Deficits have exceeded estimates and inflation is a problem. A reduction in consumer subsidies and the resulting price increases have become serious political issues.

Hungary possesses few natural resources, although it does have rich bauxite deposits and lesser amounts of coal, oil, and natural gas. During the 1980s, its chemical industry was



Trade shows have given U.S. chemical firms access to East European markets

hurt by the same problems that have plagued all Hungarian industry. Chemical industry performance has been mixed, but generally bad, says PlanEcon's Mitchell. Consumer chemicals, pharmaceuticals, and plastics have expanded the fastest, but growth in basic chemical output has lagged.

The pace at which Hungary hoped to modernize its chemical industry has faltered over the past decade and the country has lost precious time in making it more internationally competitive. However, a spate of joint ventures and several

World Bank loans have given new impetus to the modernization drive.

Most western business executives are bullish on Hungary. Western companies established more than 700 joint ventures there through the end of last year. Budapest, says Mitchell, could emerge as the "capital" of East Europe.

Although Hungary's reforms have come at a slow, steady pace over a long time span, Poland "is rushing like a train out of control" toward a market economy, says one observer. It wants to achieve a market economy in one or two years.

Change will be painful in Poland, however, probably more painful than in any other East European country. It is suffering through a Latin American style of inflation, about 800% per year. When price controls were lifted, prices soared. Wage increases have been pared, so that workers' pay has been cut in real terms.

Poles have endured hardships before, and most of them believe that the hardship of transforming into a market economy will be worth it in the long run. Although many U.S. business executives admire the Poles for the effort they are making, they believe that there's a big risk involved in investing there now.

Chemicals are not an important part of the Polish economy, and they probably never will be. Chemical output is small, but its growth, though lackluster, has outpaced that of industry as a whole.

What chemical industry Poland has is focused on raw materials and basic chemicals. There is very little production of high-value-added chemical products.

East Germany is different from the others in one important aspect. That difference is West Germany. East Germany has benefited and will continue to benefit from its close ties with West Germany. Moreover, a single, reunited Germany is likely soon.

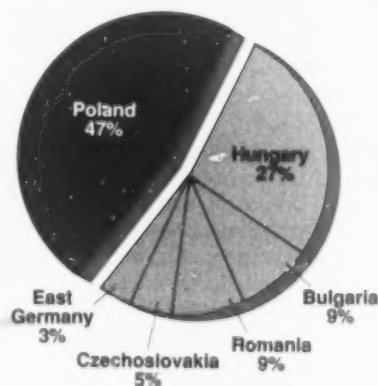
Right now, East Germany's economic outlook is mixed. Growth stagnated during the late 1980s and turned negative in last year's fourth quarter. The problems of moving from a highly centralized economy to a market-oriented system will no doubt hinder economic performance, at least for this year.

The government, looking to revitalize the economy, is counting on its new joint-venture laws and further economic reforms to attract foreign investment and technology flows. Most of this will come from West Germany, but there could be room for U.S. companies as well.

A U.S. chemical company vice president, just returned from a trip to East Germany, makes these important observations about the country:

- Most of its chemical plants are old and haven't been well main-

Poland is major U.S. chemical trade partner in East Europe



Total U.S. chemical exports to East Europe in 1988 = \$68.6 million



Total U.S. chemical imports from East Europe in 1988 = \$101.9 million

Source: Bureau of the Census

tained. It probably would be better to scrap them and start over again.

- East Germans may be Germans, but they are a product of their socialist environment. They have forgotten how to work.

West Germany's Deutsche Bank agrees that East Germany's chemical industry is outdated. In a report, the bank says that many prewar chemical plants exist alongside new petrochemical units. Productivity per worker in the East German chemical industry is about half what it is in West Germany. But even that is an improvement over the 30% that it was in 1970.

PlanEcon's Mitchell notes that the strains of East Germany's past economic policies have slowed growth in its chemical industry. The government pushed exports at all costs. In the process, it neglected investment and plant modernization. The consequences now are becoming apparent and won't disappear for some time. If not corrected, East Germany could lose its standing as one of East Europe's leading chemical producers.

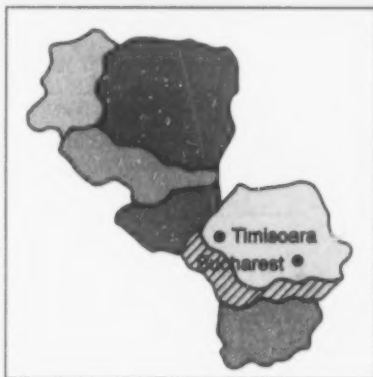
Trade may be a better way to go than investment

Those conditions that exist in East Europe make investing there extremely risky. Many U.S. companies may not want to take that risk. For them, exporting is one solution.

However, East Europe has never been much of a factor in the U.S. chemical export picture. In 1988, U.S. chemical exports to the six East European countries were a lowly \$68.6 million. That's only 0.2% of total U.S. chemical exports that year (\$32.3 billion) and is a mere shadow of the \$10 billion in chemicals that U.S. companies shipped to West Europe.

Of the \$68.6 million in U.S. chemicals shipped to East Europe in 1988, almost half—\$32.4 million—went to Poland. Poland is by far the largest U.S. chemical trading partner in East Europe. Not only does Poland account for the largest share of East European imports from the U.S., it also leads all East European countries in exporting chemicals to the U.S.

Hungary is next in line as an East



Romania in brief

Size: 91,699 square miles
Population (1989): 23.2 million
GNP (1988): \$126.3 billion
GNP per capita (1988): \$549
World trade:
Imports (1988): \$8.0 billion
Exports (1988): \$10.5 billion
Telephones per 100 people (1985): 13
Automobiles registered per 1000 people (1986): 11

Romania, consisting of two fertile areas—the Transylvanian plateau and the plains of the coastal south and east—divided by the crescent of the Carpathian Mountains, has rapidly become urbanized and industrialized since World War II.

Steel and other metals, machinery, oil products, chemicals, wood products, textiles, and food processing are among its important industries. Mineral resources include oil, gas, and coal. Forestry is also important. Leading crops are grain, vegetables, oil seeds, and grapes, and sheep breeding is significant. Romania's major imports include machinery and such raw materials as fuel, iron ore, and coking coal. Significant exports include foodstuffs, light manufactures, and wood products.

The Romanian economy was marked by rigid centralization during the 1980s, and its foreign trade declined as payment of external debt became a top economic priority of the former communist government. Foreign investment was discouraged. The government now in power, however, has taken significant steps to normalize trade and liberalize conditions for foreign investment.

European importer of U.S. chemicals, with \$18.4 million worth in 1988. Together, Poland and Hungary account for almost three quarters of the U.S. chemicals sent to East Europe. U.S. chemical exports to the other four East European countries fall below \$6 million for each of them—in some cases, well below.

According to PlanEcon, the six East European countries imported almost \$6 billion from nonsocialist sources in 1988. That means that the \$68.6 million in chemicals the U.S. exported to East Europe in 1988 represents only 1.2% of all nonsocialist exports to the region.

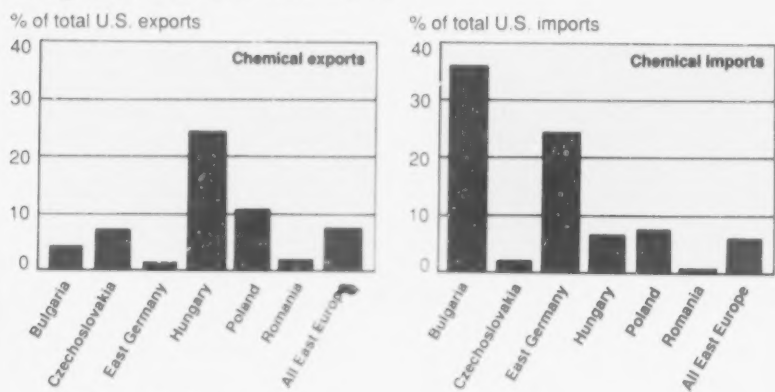
PlanEcon measures East European chemical trade in three ways. It measures total trade of an East European country in its local currency. It uses rubles for trade within the socialist bloc and dollars for trade with nonsocialist areas.

Trying to convert rubles and nonconvertible local currencies into dol-

lars is like comparing apples and oranges, says Mitchell. "There is no meaningful way," he says, "to compare socialist and nonsocialist trade." The reason is that it's next to impossible to know what the "true" exchange rate is. The official exchange rate is meaningless for all practical purposes. And the black market rate can be as much as 10 times higher than the official rate.

The rate at which trade should be measured lies somewhere in between, but nobody knows exactly where. Even the theory of "purchasing power parity" won't work because huge differences in quality of socialist and nonsocialist goods make comparisons difficult. The only accurate way to compare socialist and nonsocialist trade is to use volumes rather than values. But because so many diverse products are included in the chemical trade category, even this method becomes unwieldy.

For some East European countries, chemicals account for a big share of total U.S. trade



The United Nations computes its trade data at the official exchange rate. But despite this caveat, UN data for 1987 does confirm the obvious—U.S. chemical exports to East Europe are not only a small piece of the U.S. export pie, they are a small piece of the East European chemical import pie as well. According to the UN, East Europe imported \$7.0 billion worth of chemicals in 1987. Of that, \$3.1 billion came from the Soviet Union or was inter-East European chemical trade. Most of the remaining \$3.9 billion came from nonsocialist sources (compared with PlanEcon's \$5.5 billion in 1987).

UN statistics indicate the U.S. exported only \$79 million in chemicals to East Europe in 1987, which compares well with U.S. Bureau of Census data (\$80 million). But that \$79 million is only 1% of East Europe's total chemical imports and only 2% of its imports from nonsocialist areas. Even Japan exports more chemicals to East Europe than the U.S. If PlanEcon's figures for nonsocialist chemical imports are used, the U.S. share would be even less.

Not surprisingly, the overwhelming share of East Europe's nonsocialist chemical imports come from West Europe. Based on UN data, West Europe accounts for 81% of nonsocialist exports to East Europe. West Europe, in fact, ships more chemicals to East Europe than the combined total chemical exports from the U.S.S.R. and between East European countries themselves.

Despite the small volumes of chemicals that the U.S. exports there now, and despite the commanding lead that West European companies have in the market, U.S. chemical companies can develop sizable export markets in East Europe if they are willing to make the effort.

Vincent J. Kamenicky, director of the office of chemicals and allied products at the Department of Commerce, knows the East European chemical scene and the people in it very well. As a U.S. delegate to the chemical industry committee of the Economic Commission for Europe, he meets with them often.

Kamenicky says that the East Europeans he knows often ask about the availability of chemicals from the U.S. To promote U.S. chemical exports, he tries a different approach. He asks what chemical products the East European countries have to sell that aren't made in the U.S., then tries to find U.S. buyers for them. "If we have to import and they meet our quality requirements, why not import from East Europe," he asks.

The bottom line of this exercise is that, once U.S. companies import from East European countries, they remember it. When the time comes for these countries to import chemicals, they buy from the U.S. So far, says Kamenicky, every import he has engineered from an East European country has resulted in an export sale.

The export markets are there al-

ready, and they are likely to grow substantially if East European countries are able to get their fledgling market-based economies in order.

Between 1980 and 1988, East European chemical imports from nonsocialist areas increased just under 3% per year, according to PlanEcon's Mitchell. But between 1988 and 1994, PlanEcon had projected that those imports would grow a hefty 10.5% annually, reaching \$10.9 billion by 1994.

Those projections were made last fall. Now, says Mitchell, "that rosy forecast may have to be toned down a little." At the time that they were made, PlanEcon didn't anticipate that economic reforms in East Europe would advance as rapidly and as dramatically as they have. Nor did the company anticipate the severity of the impact that these reforms would have on the economies of East European countries.

Mitchell agrees with many other East European experts that, economically, things may get worse there for a few years before they get better. The transition to a market economy may impel these countries to cut imports before they will be in a position to increase them. Still, East Europe is an export target that U.S. chemical companies could find well worth shooting for.

A lot of western money is pouring into East European countries to help them convert to market-based economies. And a latent consumer demand will have to be met by increasing imports until their outmoded chemical plants are refurbished or replaced. This consumer demand, says Mitchell, will create export opportunities for western chemical companies.

The U.S. share of nonsocialist chemical exports bound for East Europe should increase, says Mitchell. One reason for his optimism is that East European countries admire U.S. quality. And they don't want to become overly dependent on imports from West Europe.

He also believes that U.S. chemical companies who have never exported to East Europe before will get into the act. They, along with the larger multinationals who have a long history of exporting to socialist countries, will be able to provide the

high-value-added products that will be needed in these markets.

Such products as heavy inorganics and organic commodities will not be promising because transportation costs are too much of a factor. Besides, East European countries usually produce these chemicals themselves or can obtain them easily from neighboring West European or other East European countries. It is in the high-value-added products that Mitchell believes U.S. chemical companies can carve out sizable niches in East European demand.

One possible complication in estimating the future export potential of U.S. chemical companies could come next year, when the U.S.S.R. and the socialist countries of East Europe plan to move to trade based on hard currencies. One school of thought

contends that this move will benefit the Soviets, who will then be able to charge higher prices for their exports to East Europe. On the other hand, they may be forced to keep export prices down for competitive reasons.

In addition, some East European countries may seek pricing concessions from the Soviets, or at least attempt to get a transition period during which the Soviets will grant them concessionary prices. Other countries may welcome the jolt that hard-currency trade will bring because it will force them to become more efficient.

Certainly without hard, convertible currencies, trade among socialist countries has been distorted. In some cases, these countries have used a five-year moving average of

world market prices, which leaves them out of step with current world prices.

Although the switch to hard currency trading is not a sure thing, the Soviet Union holds most of the trump cards. And the Soviet Union wants to switch to hard currency.

Another imponderable is the impact that petrochemical imports from the Middle East may have on the battle for East European markets. The Soviet Union remains the logical supplier of petrochemical feedstocks for those East European countries that do not have them. But, depending upon how pricing evolves under hard-currency trading, the Middle East could become a competitive supplier of feedstock and other petrochemicals.

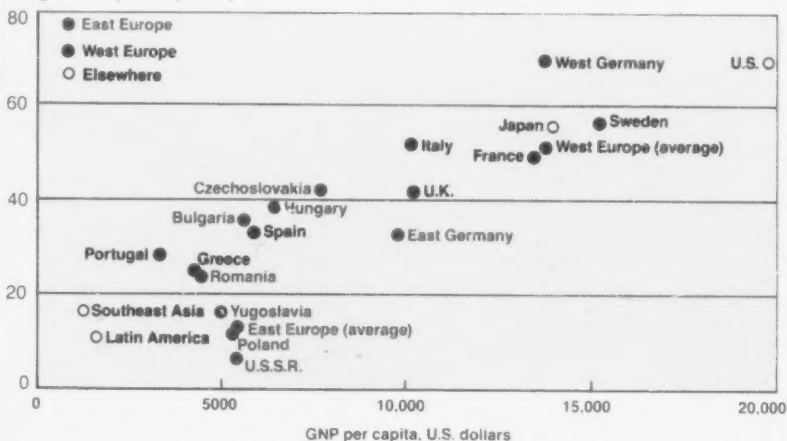
Most East European countries have extended aid and credit to developing countries, including some in the Middle East. They would welcome the opportunity to get repaid with something that they could import from that region. What's more, many consumer goods produced in East Europe, which do not have the quality to be exported to the industrialized west, could find a less-demanding market in the Middle Eastern countries. As a result, a Middle East-East Europe trade buildup is more than a fantasy. Despite the imponderables, it's more than likely that the six East European countries will continue to increase their hard-currency chemical imports from nonsocialist areas.

Meanwhile, economic reforms under way in some East European countries aim to modernize pitifully antiquated industries. This is especially true in Hungary and Poland and, to a lesser extent, in Bulgaria and Czechoslovakia. To accomplish the task, these countries will need chemicals used to make other industrial products. Examples: better paint for manufactured goods, packaging for food and other products, construction materials, and better plastics for cars and trucks.

But perhaps the most important reason of all for anticipating that East Europe will increase its chemical imports from nonsocialist areas is that the old, inefficient "command" economic system has not yet disappeared there. Although the transfor-

East Europe's use of plastics is relatively low overall . . .

Kilograms of plastic per capita



. . . but especially so for polystyrene and polypropylene

Per capita consumption, kg	Linear low-density and low-density polyethylene	High-density polyethylene	Polypropylene	Polyvinyl chloride	Polystyrene
Bulgaria	9.8	3.9	5.6	11.7	3.9
Czechoslovakia	9.0	3.7	10.7	11.3	5.9
East Germany	12.2	2.2	5.1	14.8	1.6
Hungary	11.2	6.2	6.0	10.2	4.3
Poland	3.4	0.5	1.9	4.9	1.2
Romania	5.4	3.4	3.8	7.7	1.8
Japan	9.9	6.6	12.7	14.4	8.0
U.S.	18.5	13.9	11.3	14.7	9.3
West Europe	14.1	7.1	8.2	13.5	6.0

Sources: Tecnon Ltd., Shell, PlanEcon

mation to a market-based economy is well under way, the old system still predominates. And with it remain uneven and uncertain economic performance and temporary shortfalls in output. These are shortfalls that must be met by chemical imports—including imports from the West.

The trend already is evident. East European chemical imports from nonsocialist areas declined in the early eighties, primarily because of a mounting debt crisis and the austerity programs that accompanied that crisis in many East European countries. Non-socialist chemical imports hit a low in 1982, but have rebounded since then to almost \$6 billion in 1988.

East Germany accounted for \$1.6 billion, or 27% of this amount. Poland and Hungary are close behind at \$1.4 billion and \$1.2 billion, respectively. The extensive "inner-German" trade that takes place between East and West Germany explains the relatively high level of East Germany's nonsocialist chemical imports. It also explains why the U.S. only exported \$2.3 million worth of chemicals to East Germany in 1988. That's the least shipped to any of the six East European countries, and less than half what the U.S. exported to even Bulgaria or Romania.

However, Bulgaria and Romania aren't much of a factor when it comes to importing chemicals from nonsocialist countries. In 1988, such imports into Romania were only \$279 million. For Bulgaria, the figure was \$515 million, according to PlanEcon.

However, PlanEcon's Mitchell sees little hope of western-based companies increasing their chemical exports to Bulgaria. These shipments, he says, will be tempered by the mounting Bulgarian debt and the consequent balance-of-payments problems. He projects only an average 6.4% per year growth for Bulgarian nonsocialist chemical imports through 1994. By then, Bulgaria will still remain the smallest market in East Europe for western chemical products by a wide margin.

Romania is a different story. Its fallen dictatorial leader, Ceaușescu, clamped an extremely tight austerity

on the country—far tighter than required to service its foreign debt. As a result, Romania's nonsocialist chemical imports plummeted from \$605 million in 1980 to \$263 million in 1987.

The foreign debt has been repaid, but Romania's economy has paid the price. It is in shambles. Lacking the ability to produce its own chemical needs, the country's chemical imports from the West will recover dramatically, Mitchell thinks, with an estimated 24% average annual growth through 1994.

Western chemical export potential to Hungary and Poland is difficult to predict, says Mitchell. In Hungary, the bad news is that a decade of poor economic performance clouds the possibility that chemical imports from the West will rise significantly. The good news is that talk of radical economic reform provides some hope.

Hungary's nonsocialist chemical imports were essentially stagnant between 1980 and 1988. And although PlanEcon expects growth to be uneven over the next few years, it estimates that the country's imports of western chemicals will increase an average 5% per year, hitting \$1.67 billion in 1994.

The economic crisis in Poland, triggered by its "cold turkey" switch to a market-based economy, also makes the potential for exporting chemicals to Poland uncertain. The country's nonsocialist chemical imports stagnated between 1980 and 1985 at just below \$1 billion. Then they grew rapidly to \$1.4 billion in 1988. PlanEcon expects Poland's nonsocialist chemical imports to continue growing, but growth will be limited by economic problems. PlanEcon's best guess: "modest increases" to just above \$2 billion by 1994.

West Germany makes East Germany unique among East European countries. The bulk of East Germany's nonsocialist chemical imports comes from West Germany. That will not change until, of course, East and West Germany reunify.

For now, at least, East Germany remains the largest importer of western chemicals in East Europe. These imports almost doubled to \$1.6 billion from 1980 and 1988.

They may double again, says PlanEcon, to \$3 billion by 1994. With reunification, however, there will be no such entity as East Germany.

Knowing what chemicals these countries will need is just as important as knowing where the best export markets may be in East Europe. Between 1980 and 1988, organics were the largest category of chemicals that East Europe and the Soviet Union imported from western industrialized countries, accounting for almost 25% of the total.

Organics imports included a wide variety of chemicals, an indication that East European countries, with the possible exception of Czechoslovakia and East Germany, lack a well-developed organic chemicals industry. This lack means that most East European countries, particularly Romania, should continue increasing their imports of the basic organics. Among the leading organics that they import now are xylenes, styrene, vinyl chloride, alcohols, phenols, carboxylic acids, and terephthalic acid.

East Europe imports large amounts of inorganics, too. Countries there already produce large volumes of the basic inorganics, such as sulfuric acid, caustic soda, and soda ash.

They probably will try to keep nonsocialist inorganics imports as low as possible and keep their scarce hard currency available to import organics, plastics, and other more sophisticated chemical products. Western companies can expect only a modest expansion of inorganic imports from the East European countries.

Because East Europe produces vast amounts of fertilizer, its fertilizer imports have been among the smallest of any chemical category. Nevertheless, East Europe doesn't produce enough of certain kinds of fertilizer to meet its own demand.

Large tonnages of products, such as concentrated and compound fertilizers, superphosphates, and potassium fertilizers, are imported from the West. And since some East European countries have explicitly said that the trend is toward the more complex and higher analysis fertilizers, they will have to continue importing them. Recent disappointing

crop harvests will add to their fertilizer import demand.

The Soviet Union and other East European countries, particularly Hungary and Poland, have been large importers of western plastics and resins. Plastics, in fact, rank only behind organics as the largest East European chemical import from nonsocialist countries.

The plastics revolution, says Mitchell, still hasn't hit East Europe. There will be opportunities for western companies to supply plastics for every aspect of East European industrial and everyday life. Although several plastics plants have been or soon will be completed in the region, countries there still must rely on imports to satisfy demand.

Despite recent hikes in output, the area still is short of polyethylene and polyvinyl chloride, and probably will continue to be for years as production shortfalls crop up. These polymers will be imported. Polypropylene and polystyrene production is still in its infancy in East Europe. Imports, primarily from the West, will be a must. So, too, will be imports of engineering resins because it will take years for East European countries to build up their domestic capacity.

Another reason why western companies can anticipate exporting more plastics and resins to Eastern Europe is the possibility that plant accidents could shut down a plant and disrupt local production. It happened in Devnya in 1986, when an explosion nearly wiped out 1987 Bulgarian PVC production and forced the country to rely on additional imports from western suppliers. It could easily happen again anywhere in East Europe.

Western suppliers, including U.S. companies, can expect demand for many more sophisticated, high-value-added products to increase in East Europe. For instance, East European imports of paints, dyes, and other coloring agents should grow rapidly simply because they are not available from domestic sources.

No one ever said that converting from a hard-line communist society to a democratic society based on free market principles would be easy for East European countries. So, too, should imports of finished medi-



Bulgaria in brief

Size: 44,365 square miles

Population (1989): 9.0 million

GNP (1988): \$67.6 billion

GNP per capita: \$7540

World trade:

Imports (1988): \$4.46 billion

Exports (1988): \$2.45 billion

Telephones per 100 people (1985): 20

Automobiles registered per 1000 people (1986): 120

Bulgaria is the smallest of the East European countries in terms of population and national output but also has enjoyed perhaps the highest rate of investment and economic expansion in recent years. Its rapid growth, however, has resulted in exports failing to keep up with imports and a deteriorating balance of trade.

Largely self-sufficient in agriculture, the country grows grain, fruit, corn, potatoes, and tobacco. Important mineral products include lead, bauxite, and low-grade coal. Major industries include chemicals, machinery, textiles, fur and leather goods, and food processing. Major imports include machinery, fuels, mineral raw materials, and chemicals; major exports include machinery, foods, textiles, and such chemical products as fertilizers and rubber.

Because of its small size, U.S. trade and investment is relatively low. Bulgaria's harsh treatment of its Turkish minority in recent years has strained relations with the U.S. However, the country has enacted economic reforms, including legal rights for private investment and a law permitting 100% foreign ownership, in the past two years to attract foreign trade and capital.

nals and pharmaceuticals, which are extremely short in some East European countries.

And it won't happen overnight. It will take years. This combination of time and hardship leaves open the question: Will some of the East European countries call it quits and revert to a socialist society?

Although most East European experts doubt that this will happen, they by no means claim that it couldn't happen. The hardship now ravaging Poland, for instance, may be a steeper price than Poles may be willing to pay for much longer.

But Orenski points out that the Poles have maintained a lot of discipline in the face of astounding changes and hardship. He and other East Europe watchers believe that the Polish people will not surrender to their difficulties and will see the transition through. Others point out that their hatred of anything communist will guarantee it.

There are many questions. What if the good times under a market economy don't come as rapidly as East Europeans expect—or hope? What if converting to a capitalistic system turns out to be long and difficult? Will East Europeans become tired of shouldering the burden that comes with the transition and opt for a return to socialism?

Romania is also a possible candidate to give up on a complete switch to capitalism. Romanians have long been accustomed to authoritarian rule. Some experts cautiously express the view that a reversion to a Ceaușescu-type rule, without the ruthlessness, is not completely out of the question.

These are difficult, if not impossible, questions to answer. The popular response is: "It's unlikely." Still, it's a question that cannot be ignored. But, as Ethyl's Turnipseed says, nobody will have the answer for at least another five years. □